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Cashing In on Touring

MOTOR AGE

Volume XXXV
Number 19

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CHICAGO, MAY 8, 1919

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Hudson Dealers Are Prosperous

Super-Six Brings Profits

Hudson dealers sell more fine cars than any other dealers in the world. Their stores are among the finest. Everywhere they are growing more prosperous daily.

Hudson dealers are of the highest type of business men. Their keenness and ability has been a great factor in Hudson growth. But they will admit that without the Hudson Super-Six their prosperity could not have been so great.

Sixty thousand satisfied owners testify to the popularity of the Hudson Super-Six. And each year adds to the number of pleased owners. Every year the total in profits which our dealers share increases.

Production of Super-Sixes has never been able to keep pace with demand. The Hudson is ever expanding. Hundreds of thousands of dollars' worth of machinery for increasing output has been installed this year.

To take care of our rapid expansion we will add to our dealer force some new organizations. There will be $12,000,000 in profits to be divided among our dealers this year.

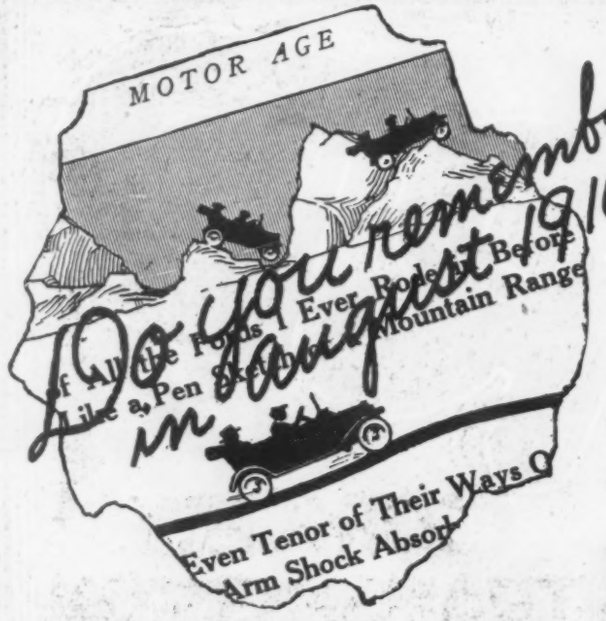
If you are a dealer of the Hudson type—one who wants to grow along with Hudson—get in touch with us. This is the time.

HUDSON SUPER SIX

Hudson Motor Car Company

Detroit, Michigan

Entered as second-class matter Sept. 19, 1899, at the post-office at Chicago, Ill., under act of March 3, 1879

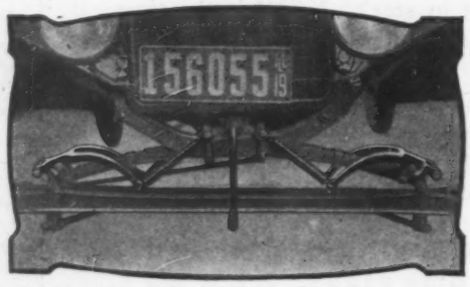


W. & C.

The Original Double Arm Shock Absorber for Ford Cars

The Original Double Arm SHOCK ABSORBER W&C For FORD CARS

IS GOING STRONGER THAN EVER TODAY



One of the most interesting things for dealers to know in connection with W. & C. Shock Absorbers for Ford cars is that after a continuous sale for more than three years they are going stronger today than ever before.

More than 200,000 sets of W. & C. Shock Absorbers are in use—nearly 100,000 of them have been in use for two years or more.

Growing sales and continued service explain the success of W. & C. dealers everywhere.

It's all in the principle and material we use.

Say **"W. & C." to Your Jobber. He Knows.**

PRICE STILL
$10 PER SET OF 4

P. H. WEBBER COMPANY
Hoopeston, Illinois

Chicago Sales Dept.
STAFF & ECKHOUSE
616 South Michigan Blvd.

MOTOR AGE

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A NECESSITY for Every One of Your Customers

DUTCH BRAND
TRADE MARK

2-in-1 CUT FILLER

This Display Stand Makes Easy Sales

Put this display stand on your counter and Dutch Brand 2-in-1 Cut Filler will sell itself. An article so necessary to motorists as this requires no great effort in selling. As soon as a car owner knows about it HE BUYS IT.

Dutch Brand 2-in-1 Cut Filler is a heavy liquid rubber that fills permanently cuts, bruises and gashes in casings. It prevents sand and water pockets, rotting of fabric and adds many miles to the life of any tire. No cement required—no trouble to use—quickly applied.

Get a stock from your jobber and begin making profits on the easiest seller in your store.

Send for a Dutch Brand Catalog

The complete Dutch Brand line is illustrated and described in detail. Every article fills a demand. A catalog will be sent you upon request. *Write for it.*

Van Cleef Brothers

Manufacturers of Tire and Chemical Specialties

Woodlawn Ave., 77th to 78th St.
CHICAGO, U. S. A.

102,000 Miles and Still Running
Replacement Costs Less Than $65

Velie

Wayne, Nebraska,
Feb. 19, 1919.

Velie Motors Corporation,

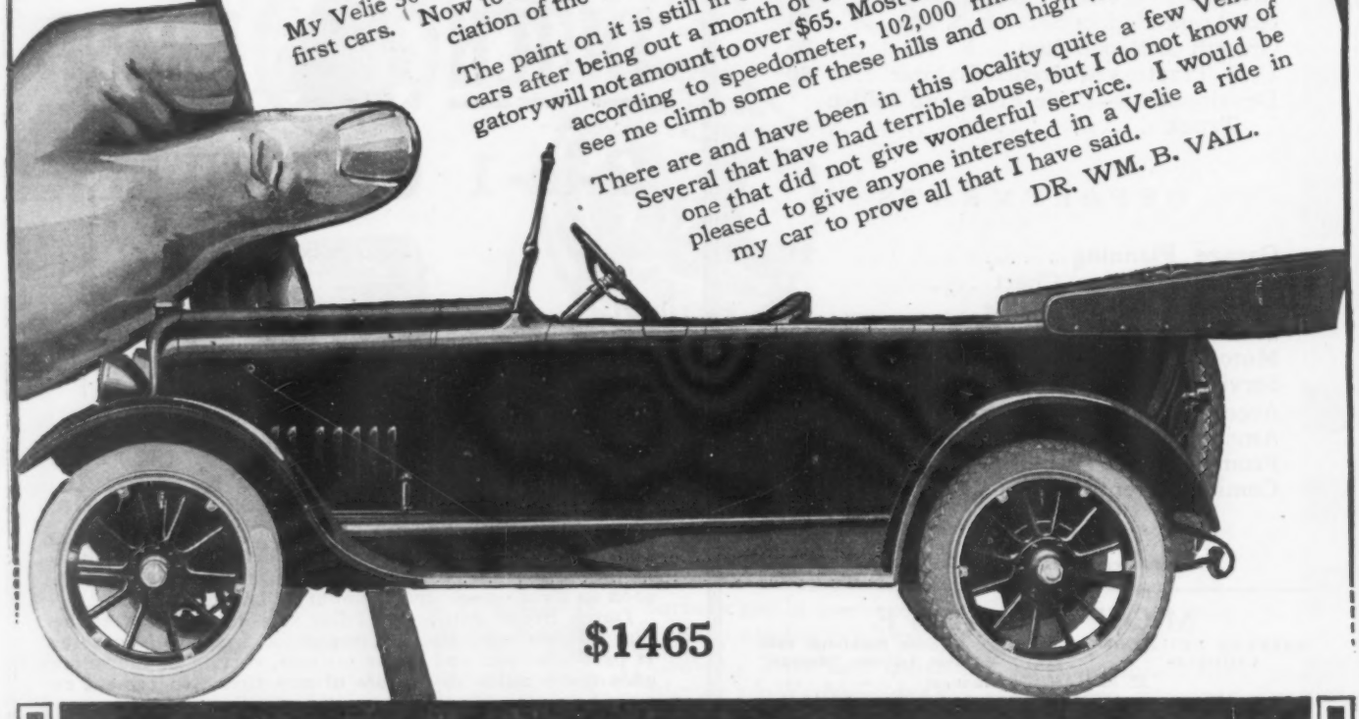
Gentlemen:

My Velie 30-1909 car bears the number 284A. It must have been one of your first cars. Now to describe it and to show my success with it, and also my appreciation of the way it has served me these nearly ten years.

The paint on it is still in elegant shape and luster. It looks like most cars after being out a month or two. All replacement that was obligatory will not amount to over $65. Most of that babbitt work. It has run, according to speedometer, 102,000 miles. I wish you could see me climb some of these hills and on high with this Velie.

There are and have been in this locality quite a few Velies. Several that have had terrible abuse, but I do not know of one that did not give wonderful service. I would be pleased to give anyone interested in a Velie a ride in my car to prove all that I have said.

DR. WM. B. VAIL.



$1465

This Is the Kind of Construction Values That Go Into Every Velie

Velie cars with their unequaled construction values have multiplied customers until all the resources of a mile of Velie factory are required to meet the demand. The bigger—better—more powerful Velie of 1919 is not matched at anywhere near its price in the whole light six field.

This is why the Velie franchise means more than ever to dealers. If your territory is open, write for details and the new Velie plan.

VELIE MOTORS CORPORATION, 113 Velie Place, Moline, Illinois

Builders of Automobiles, Trucks and Tractors

Cashing In on Touring

There are still among us some dealers who need a little education concerning the modern conception of advertising. Some still tell you that they "don't need to advertise our business," but no one who knows the power of the printed word would be guilty of such an expression.

The whole trouble, as we see it, is that many dealers fail to make a close study of their prospects and advertising does not always pay until this is done.

You must adapt your advertising—whether it is newspapers, signs, booklets or any other kind—to fit your business and prove to your prospect that you have studied his requirements and that the services you offer is service in its highest sense.

The lead article in this number of MOTOR AGE is aimed to show you how you can draw tourist trade through various channels of publicity.

When you've finished reading this story, turn to the article on

Roads as Service Advertising Medium

It closely follows the lead article with concrete suggestions as to the signs you might erect in your locality.

And when you think of advertising, don't forget that pleased customers are a valuable advertisement—the kind that multiply themselves by sending you strangers—live prospects.

THE WHITE HEAVY DUTY TRUCK

with

DOUBLE REDUCTION GEAR DRIVE

Having all the leverage and flexibility of a chain and sprocket and the frictionless driving contact of gears which *roll* in oil, dust proof

A New Low Cost OF HEAVY HAULAGE

The new White heavy duty trucks have been designed with but one end in view: to do more work at lower cost. They carry forward the White policy of building trucks to do the most work with the least effort.

For years the chain-driven White has set the pace in heavy haulage. It has held its own against a field of competition based on new axle features. It has won its place by sheer merit *as a truck*, and not because of any single feature in it. It is standard today in America's greatest fleets.

In White Trucks, mechanical changes are made only to improve operation. The company has always sold operating efficiency—*truck performance.*

The heavy duty models remained chain-driven until we were able to develop an enclosed form of drive having all the advantages of chain and sprocket. This has now been done. The Double Reduction Gear Drive is the full counterpart of chains in *applying* power. It has the chain *pull*, in *gear* form.

The new trucks follow a twofold aim in White design: sturdy engine up in front and maximum pull in the rear. The final drive saves power and therefore fuel. The lubrication saves oil. Light unsprung weight saves tires. Continuous operation saves time of both truck and driver by a steady volume of performance.

In all its years of transportation service, The White Company has never swerved from its original purpose to build an *economical* truck.

These new trucks are money *savers.*

THE WHITE COMPANY

CLEVELAND

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MOTOR AGE

Cashing In on Touring

Profit from This Trade Is So Much Velvet, Says a Dealer—Why Not Dress Up Your Place of Business in the Well-Known Fabric?

C & A ROAD MAP

GARAGE OPEN DAY & NIGHT

Steam Heated

C & A AUTO SUPPLY COMPANY
PITTSBURG, KANSAS

This concern has made many a tourist call down blessings on its head

Getting the customer to the door is the secret of success in practically all lines of business. It is particularly true of the automotive industry. Highways are the arteries of business for the garage and service station. Highways bring many a customer to the door of the garage and service station. Why not take advantage of this status of affairs? Cash in on the tourist trade.

If you are on a main traveled highway, so much the better. If it is a marked highway, especially a transcontinental highway, you have every opportunity to cash in on touring. If you do not cash in on it, something is lacking in your own place of business.

The old whine of the unsuccessful merchant that he cannot sell anything if the customers do not come to his place of business is completely knocked out. The garage or service station cannot escape getting a certain amount of tourist trade, whether he seeks it or not, that is, motorists on long or short trips will stop at his place eventually. But taking care of the casual callers only is not enough. Unfortunately, too often these even cannot be taken care of. To cash in on touring the dealer must do two things:

First—Draw the trade.

Second—Be prepared to take care of the trade after it is obtained.

The first point is treated in this issue. Next week "Get Ready for the Touring Season" will complete the cycle.—EDITOR.

FROM PITTSBURG TO

	Miles		Miles
Arma	9	Jasper	27
Asbury	15	Joplin	34
Arcadia	20	Kirkwood	4
Brazilton	24	Liberal	21
Baxter Spgs.	28	Lawton	21
Bronough	31	Lamar	30
Chicopee	5	Minden	10
Cherokee	12	Mulberry	15
Crestline	16	Monmouth	17
Columbus	23	McCune	22
Carl Jct.	24	Mound Ville	37
Carterville	31	Nashville	14
Carthage	40	Nevada	47
Dunkirk	7	Oronogo	28
Englevale	15	Pawnee	31
Frontenac	4	Radley	8
Fleming	7	Ringo	10
Farlington	23	Scammon	15
Fort Scott	35	Sheldon	39
Faulkner	37	Sarcoxie	57
Girard	15	Weir City	11
Georgia City	18	Waco	17
Galena	27	Webb City	31
Hannon	25	Walnut	34
Iantha	24		

	Miles
To Kansas City	135
To Parsons	36
To Miami	48
To Coffeyille	78

The back of the card at the left. A map attached also

CASHING in on touring begins with getting the tourist to stop at your place rather than at some other's. This year offers unusual opportunities for the dealer or garageman to cash in on touring, for there is every prospect that more tourists will be going his way. The touring season is opening earlier than usual. Many of the country clubs are opening a month or more before the usual time. More motorists are going on long trips than for several years. In fact, the prospects are that a new record in the volume of tourist travel will be set this year. Both long-distance trips and short-distance trips are sources of income to the dealer, and it is to his very great advantage to make the most of these opportunities.

It is to be hoped that most of the overhauling jobs are out of the way or will be by June at the latest. This will give you needed room for local and tourist trade and make it possible for you to give better service. You must remember, more than one

dealer has said, the profit from tourist trade is just so much velvet. You can make that velvet part of your annual profits, with a more or less close estimate as to what you can expect to make therefrom, once you seriously take the tourist trade as a business and not as an accidental break in the day's routine of repair work.

Just how much of this class of trade you will draw to your establishment depends, for the most part, on two things, or rather one:

1—You must have equipment.
2—You must have system.
The two make service.

Equipment Plus System

We say that equipment and system make service with the thought in mind that the best of systems in the garage or salesroom cannot avail if those time-saving, labor-saving devices typical of the modern dealer and garageman are lacking. Nor can we have system unless the presence of competent workers is taken for granted, for system does not prove itself until it has been tried out in practice, and it cannot be tried out without workers. The garage that caters to, or merely aims to profit from, tourist trade must have competent workmen, efficient equipment and a system that makes of the whole that service which the automotive business is coming to require more and more every day.

If you are located on a marked highway, so much the better. If that marked highway is a transcontinental highway, then so much the better still. But whether you are on a marked trail, a transcontinental highway or a city street, a country road or a town square, you will not be taking the full advantage of the possibilities that are contained in touring unless you make it a business to cash in on touring.

There are several ways in which you can bring the passing tourist to your door rather than to the other fellow's:

1—You can erect signboards along the highway.

2—You can distribute booklets or cards in the hotel lobbies of the neighboring towns.

3—You can so make your light shine that your customers will multiply themselves by sending to you strangers.

Other Ways Also

There may be other ways. But these are certain to affect your tourist trade. Signboards along the highway call attention to the fact that your garage is waiting for the motorist who reads your sign, that you are ready—as you certainly should be—to give the very service that particular motorist may need, whether it be road information, hotel direction, repairs or supplies. The signboard may give the distance to your garage, with the proper directions as to how to get there. Details as to the signs a dealer or garageman might erect are given elsewhere in this issue.

Booklets or cards are distributed mainly to impress the name of your establishment on the prospective customer. If they are given out in the lobbies of adjacent towns, so much the better, for then tourists coming your way have you in mind. Especially will this bring you trade if you have followed it up with signs along the roads.

Each customer, whether he be from a distance or in your own town, is a prospective advertisement of your place of business. A pleased customer, remember, will be a good advertisement, but a customer with a real or fancied cause for complaint should never be allowed to come about. It is your ability to prevent this latter class of customers that will determine the extent to which you will be able to cash in on touring.

When you realize the fact that every tourist who comes into your neighborhood is a potential customer, the magnitude of the opportunity can be gaged perhaps more accurately. It also will lead the dealer and garageman to see that it is up to each one to do everything he can to attract tourist trade, to insure a return engagement of those tourists who are now merely passing through for the first time. Especially is this true of the tourist on a short trip. The nearer a man lives to you, the more likelihood is there that he will come your way again sooner or later. If your service is good enough, in all probability it will be sooner, for the world will wear a beaten path to the door of that man who gives service that is service in its highest sense.

Importance of Extra Service

For this reason it is very important that the dealer be able to give to the tourist that additional service which will make him feel always that he certainly has got more than he expected. Let him feel that he does not pay for everything you do for him, if you can. A small booklet or card, such as that illustrated, is an example of what can be done along that line. Other ideas may suggest themselves from time to time.

There is one possibility perhaps the dealer has not studied about as much as he should have. Many tourists start out on a trip with the idea of camping out along the way. If he is going to stay at a hotel and you furnish him with information as to where to stop and how far off, well and good. But suppose he wants to know where he can pitch a tent and stay all night and there is no camping site in your town? What are you going to do then? True, many localities now have the regular camping location, some free, some with small charge for attendant. Some of these are fitted up complete in every detail, with water, fuel, tables and other conveniences. But there are few localities which could not officially designate some plot of ground as a camping site, even though there were no improvements to set it aside from its adjacent lots. If it is city property, ask the city officials to permit you to direct tourists there? If it is private property, permission of the owners will have to be obtained, of course.

Another thing that is going to help you cash in on touring, this year and in after years, is good roads leading in and out of your town. As the article last week told you, it is strictly your business to work for good roads, if you are a dealer. The same is true of a garageman. Good roads not only increase the sale of automotive vehicles and equipment but, through those very sales, create a bigger army of potential tourists, and there you are.

To cash in on touring, of course, you are going to have to make further preparations than if you were merely going to take care of your regular, local trade and handle tourist trade, which might happen in, to the best of your normal ability. That is not enough. There is profit for the dealer and garageman in the tourist trade, but they will have to make some effort to get it.

To cash in on touring you will have to look, first, to:

1—Equipment.
2—System.

Equipment Is Necessary

That is to say, you must have the engine stands, piston vises, aligning jigs and similar devices to enable your shop to give quick, adequate service; you must have the methods which make the best use of that equipment, that is, you should have a trouble shooter, who can look over the tourist's car as he drives it up to your door, tell what is wrong with it, about how long it will take to fix it and so on. Also you will have to provide for night service of some kind if you are really to take care of tourist trade. This night service may be limited, but you will have to give it if you are to satisfy the tourist, for no man wants to be tied up all day waiting for his car when it could be done at night, when he is stopped anyway. The equipment already mentioned, such as engine stands, piston vises, aligning jigs, etc., will help you reduce your night force to a minimum, as one man can do many jobs alone when he has the proper equipment, whereas it would take two or even more without special equipment.

Some provision also must be made for towing in cars. A service car or truck should be in readiness to send out on the road. There are special parts you should stock up on before the touring season gets far along and there are other things to attend to before you can really cash in on touring. There will be more on this, however, in next week's issue. Just now let it suffice to say that to cash in on touring, you must do two things:

1—Get the tourist to stop at your place.

2—Be ready to take care of him when he does.

Exterior Should Attract

Not only should you work to attract him toward your place, but the exterior of your garage or repairshop should be such that it emphasizes any magnetic qualities begun with previous signboards or distribution of cars and booklets. Clean up your place. Wash your windows. Not just once, but frequently. Arrange your accessory displays neatly in the window. You may not have access to a good window dresser, but wonders can be done with a little window washing and a well displayed stock.

Dealers Not to Ask Consumers to Pay the War Levy

But Only to "Reimburse Manufacturer for Excise Tax"

NEW YORK, May 2—Although no definite rulings have come through yet from the Internal Revenue Bureau with regard to the new war tax, the National Automobile Chamber of Commerce has received a number of preliminary rulings. In consequence of these it is suggested that dealers and distributors do not ask purchasers to pay a tax, but merely to reimburse the dealer for the tax which he has had to pay to the factory and which the factory in turn has had to pay to the Government.

It is suggested that the tax item be indicated by the expression "To Reimburse the Manufacturer for Excise Tax." It is also pointed out that while the department's first thought was to tax retail sales on the basis of the highest wholesale price received, the bureau has now indicated that such sales probably will be taxed on the basis of the average price received on wholesale sales during the preceding month.

It is not likely the manufacturer of tires, tubes, parts and accessories will be required to pay a tax on these product under the new war revenue bill when they are supplied to car or truck manufacturers as original equipment. Manufacturers of such products who supply tires, tubes, parts or accessories to manufacturers of vehicles for paid replacements or repairs, however, will be required to pay a tax. It is suggested that parts and accessory makers bill the car and truck manufacturer with tires, parts and accessories at the regular price, with a notation on the bill that the 5 per cent war tax may be added later if the Government so orders. Commissioner Roper has ruled in a letter to a member of the N. A. C. C. that when a part on which a tax has been paid is returned for credit, the amount of the tax may be deducted from the next tax return, this eliminating the need for applying for a drawback.

The internal revenue department is preparing and has practically completed regulations covering the application of the entire excise tax act to the automotive industries. It is expected that this will be issued in a short time. Because of this fact the department will not approve the primer which was prepared jointly by the Motor & Accessory Manufacturers' Association and the National Automobile Chamber of Commerce.

ARROW GRIP GETS NEW PLANT

Glens Falls, N. Y., May 3—Ground will be broken at once for the new plant of the Arrow Grip Mfg. Co. The company has been reorganized and new directors added. The following officers were elected at its annual meeting: President, George Tait; vice-president, William H. Denning; secretary and sales manager, E. G. Mertens; treasurer, William H. Gelshenen; assistant treasurer and general manager, T. M. Avery. The officers and George F. Underwood, C. F. Burns and G. F. Bayle, Sr., form the board of directors. The Arrow Grip Mfg. Co. is incorporated for $500,000.

This Kind of an Accident Is an Almost Daily Occurence in Paris

Since the armistice large numbers of new civilian drivers, who have not more than a few weeks' experience, have come on the streets of Paris, and these men have done much to increase the dangers. Also numbers of cars are now running in a most dangerous mechanical condition. The greatest danger arises from broken stub axles, many cases of which can be observed daily by wandering around the streets of Paris. Broken steering gears are also exceedingly common.

Car Production Is Rapidly Increasing

Output, However, Far Behind Demand; Labor Difficulty Holding Back Factories

DETROIT, May 3—Motor cars are being produced at an increasing rate but production is far behind demand. Production figures for Michigan and Ohio show that approximately 7084 automobiles were made daily during April. This is an increase of 1353 cars daily over the daily March production of 5741 cars and nearly 2½ times greater than the production of January when 2984 machines were turned out each day.

The unprecedented pile of sales orders in the hands of manufacturers is evidence that if every factory could double its production every car would have an immediate sale. The demand for cars is greater today than at any other time in the history of the automotive industry. The demand exceeds the production of practically every company from 33⅓ to 70 per cent.

If the majority of the plants increase production during May as many are now endeavoring, daily production for the present month will average approximately 10,000 cars and the month of June will see it reach a high mark under present manufacturing conditions. So great is the demand that many plants are rushing work on new building units. This is noticeably true of the Jordan Motor Car Co., Cleveland, which proposes to build a new plant greater than its present establishment. The Hudson Motor Car Co. is pushing work to the limit on new units to handle Essex production. Scripps-Booth will have a new factory this fall. General Motors expansion plans call for greatly increasing the manufacturing facilities of Buick, Oakland, Oldsmobile, Cadillac, Chevrolet and its other passenger-car units.

April Production Boosted

Production during April was boosted despite the handicap of a tight material market and labor difficulty. All parts makers are experiencing an equally great rush of business and are unable to keep up with orders. As a result the companies depending upon them for parts are obliged to limit production to their parts supply. The parts makers have not switched from a war to peace basis with the same rapidity as the motor car companies and as a result are just beginning to reach capacity production. They have been harder hit by the hold-up of funds on government contracts but this disadvantage has lately been overcome by the willingness of the Government to advance 70 per cent of the money they claim is due them, leaving the remaining 30 per cent to be paid when the contract claim is finally approved at Washington .

Detroit manufacturers have encountered considerable difficulty in obtaining a steady flow of castings from the foundries due to labor trouble. During April, 13 Detroit foundries were tied up by strikes. Seven are still affected but six of the strikes have been settled. The companies all have had trouble in various departments but in almost every instance the workers returned to work in the course of a few hours. However, suspension of operations for but a brief period has had a marked effect on production, causing the April output of a number of concerns to fall short of schedule.

Daily production figures are as follows:

Car Production from Michigan and Ohio

CAR	JAN.	FEB.	MARCH	APRIL
Buick	100	400	450	500
Briscoe	30	50	50	75
Barley	...	4	10	12
Cadillac	55	60	80	100
Chalmers	30	65	70	80
Chandler	...	50	90	60
Chevrolet	...	300	350	700
Columbia	8	10	15	18
Dodge	300	375	400	500
Ford	1,300	2,000	2,400	3,000
Harroun	4	4	10	15
Hudson	30	50	50	100
Hupp	38	55	65	75
King	...	4	10	10
Liberty	15	15	25	30
Maxwell	150	150	220	250
Oakland	160	160	200	...
Olympian	4	5	10	12
Oldsmobile	...	110	140	140
Overland	320	400	422	600
Packard	...	...	1	25
Paige	50	50	55	70
Patterson	10	10	10	15
Jordan	...	...	...	12
Saxon	10	50	65	50
Scripps-Booth	20	40	45	45
Studebaker	150	150	175	200
Essex	30	50	50	100
Grant	25	35	50	50
Total	2,984	4,822	5,741	7,084

The Packard Motor Car Co. is increasing its production rapidly. Two hundred passenger cars were produced in April. In May 350 passenger cars will be turned out while June and July production calls for 500 cars monthly. Trucks are being made at the rate of 750 per month.

The Paterson Motor Car Co., Flint, Mich., is running fifteen cars daily and is preparing to increase this production. The company has encountered some difficulty in securing material but this situation has been greatly relieved within the last three weeks.

Dealers Crying for Cars

King dealers all over the country have sold their car quota, it is stated at the King Motor Car Co. Dealers are coming in person from far states in an effort to secure machines to sell. The Detroit distributer has sold forty since Jan. 1 and has orders for thirty-five more for immediate delivery if he can secure the motor cars. The company is running fifteen cars daily and is preparing for a production increase.

The Scripps-Booth Corp. will be housed in its new $1,500,000 factory this fall. While this plant is in construction, production of the present plant will not be affected. The company is turning out 45 cars daily while the demand calls for 50 per cent more cars than can be produced. The company is exporting 150 cars monthly. Its California distributer has just placed a standing order for 300 cars a month.

The Chandler Motor Car Co., Cleveland, O., is unable to build cars fast enough to supply the demand. The sales are from three to four times greater than any previous time in the company's history. The company hopes to produce 2500 machines this month and 3000 in June. At present, the company is running approximately sixteen cars daily. The Chandler people expect to build more cars this year than ever before.

The Harroun Motors Corp., Wayne, Mich., is now running fifteen cars daily. Within the next 30 days the company hopes to produce twenty-five cars per day. The company has orders for all the cars it can make within the next 6 mo. The big assembly department of this plant is still choked with Government machinery, which has not been removed to date. Until this machinery is taken out production will be greatly curtailed.

The Dort Motor Car Co., Flint, Mich., is running more cars daily than ever before since the company was organized. Daily production is hitting the hundred-car mark. The company has three times more orders than it has cars. The entire production for the months of May and June is already contracted for.

DETROIT WANTS MECHANICS

Detroit, May 2—Detroit wants mechanics. There is a 50,000 shortage of both skilled and unskilled labor in Detroit and an advertising campaign is being conducted in sixty-nine cities where a surplus is reported. The larger companies are going even further and are sending field representatives into these localities to head the unemployed towards Detroit. An example is the Packard Motor Car Co., which could use 500 more men immediately. This company has sent men to Camp Custer and to Great Lakes Naval station and is offering immediate employment to all service men the minute they are released from service. Every company has more business than it can handle and the cry for men is becoming greater daily.

As a result wages are growing higher and it is predicted that within a month the scale will be greatly increased everywhere. The great obstacle which the companies must solve is the housing situation. This is daily becoming more critical. Rents are soaring and homes are at a premium.

Motor car companies are meeting this situation manfully and are not only contemplating house construction for employes but are aiding in the financing of a $5,000,000 corporation which proposes to start work at once on several thousand homes.

Detroit's labor problem has swung from one extreme to the other within three months. In February between 30,000 and 50,000 men were without jobs and the word was sent out to stop the flow of labor to Detroit. This warning had a noticeable effect with the result that Detroit is now up against a huge shortage. The first of May saw labor demonstrations of a minor nature in Detroit. There are many strikes on here and a universal cry for more wages is heard. The big automotive concerns are not greatly affected however.

HOOSIERS "GATHER AT THE RIVER"

Indianapolis, Ind., May 3—"Shall we gather at the river;" that is the caption that headed a letter sent out to sixty-one members of the Indianapolis Automobile Trade Association by Manager John Orman. The letter was an invitation to the spring entertainment of the dealers, and known this year as the "Romp." It was

pulled off last night at the Indianapolis Athletic and Canoe Club, and there were present two hundred and twenty-six men of the trade with three or four prominent speakers, but one of the first orders given by the president, A. B. Wagner, was that there was to be no speaking during the evening, an order that was vigorously applauded by the crowd.

There was a dinner served and it was of the regular old-fashioned beefsteak kind. The dinner was started off by assembly singing, led by a song leader from Camp Sherman. A jazz orchestra from Camp Grant furnished the music during the meal.

A select vaudeville bill was on hand to further the cause of happiness for the night and a battle royal in which six stalwart colored gentlemen took part rounded up the meeting. The Romp is the first of a series of entertainments to be given by the association every two or three months.

Among the guests at the dinner was Thos. Hay, treasurer of the National Auto Dealers' Association.

IOWA MOTOR TRADES BUREAU

Des Moines, Ia.. May 1—Organization of the Iowa Motor Trades Bureau, which is the state organization of dealers, is well under way. At a meeting to-day the constitution and by-laws were passed upon and headquarters officially opened in this city. Andrew Knapp, formerly secretary of the Commercial Club, Waterloo, Iowa, has been engaged as state secretary and started his work in Des Moines to-day. Many organizations throughout the state have already joined and at to-day's meeting were representatives from Waterloo, Cedar Rapids, Marshalltown, Carroll, Mason City, Ft. Dodge and other points.

From Mason City forty members joined, which includes not only every dealer and garageman in the city but every organization connected with the industry such as paint shops, etc. Over forty members are coming in from Ft. Dodge and a similar number from many of the other cities. It is planned to have every dealer and garageman as well as others connected with the industry in the state a member in the next six months.

Tonight the Des Moines dealers had 165 of their members and visiting dealers at their regular monthly dinner held in the Chamber of Commerce rooms. David Beecroft, Directing Editor of the Class Journal Co., spoke on the dealers' problems in Europe during the war and also on his experience over the war zone in January. The Des Moines dealers on May 12 are going to give a testimonial dinner to Capt. Eddie Rickenbacker and have taken the entire Coliseum for that date.

WATERLOO DEALERS FORM BUREAU

Waterloo, Ia., April 29—Waterloo dealers to-day formed the Black Hawk County Motor Trade Bureau, to take the place of the former Waterloo Motor Dealers' Association. In co-operating with the new state organization known as the Iowa Motor Trades Bureau the Waterloo dealers believed it best to form a county organization rather than one for the city. A constitution has been adopted and already most of the dealers, garagemen and others in the industry have become members.

Rules for Tractor Demonstration Suggested

Agricultural Engineers Adopt Standardized Code for Conducting Plowing Tests

CHICAGO, May 2—The American Society of Agricultural Engineers has recommended a code of rules for local tractor demonstrations whose purpose is to put every entering tractor on an equal footing, considering its capacity, and so make it possible to determine with accuracy the quantity and quality of its work and its cost of operation, measured in terms of fuel consumption, etc. The rules do not provide for competitive tests of drawbar or belt power.

Before entering the demonstrator must give the name and model of his tractor with a description of the plow which will be used throughout the test. This information is entered on a data sheet, which gives also detailed description of the land and soil conditions.

Data on tests will determine: Length and width of field plowed, average depth of plowing, area plowed, time consumed in plowing the allotted area, miles per hour of plowing speed, quantity of gasoline or kerosene and water consumed, amount of fuel consumed per acre and its cost. The rules and regulations prescribe ways and means of determining all these things. Two observers are attached to each machine whose duties it shall be to see that the provisions of the rules are fulfilled. The rules are:

1—Only one tractor of each model of the same make may be entered, except where all tractors are owned and entered by farmers. All tractors entered to be stock machines as regularly sold, each tractor should have a prominent placard not over 22 in. in height and 30 in. in width. If smaller size is used, the dimensions should be of similar proportions.

2—Public demonstrations to be from 1:00 noon to 3:00 p. m., or a total of 3 hr.

3—Each land should be numbered as soon as measured and each entry should draw for position on the field. The number drawn entitles the entrant to the plot bearing that number.

4—For calculating final results, all land to be measured from outside to outside of furrow in each case.

5—Two observers are to be provided for each tractor in the field—one to keep account of fuel used and time elapsed; the other to check the depth and width of plowing.

6—A stop of more than 30 min. in the aggregate, due to tractor trouble, disqualifies any single entry.

7—To be very carefully checked every 10 rods. The A. S. A. E. (Heylman) depth gage is recommended for this purpose.

8—The width of the inside plow should be checked frequently by the observer and the operator should be made to maintain a uniform width of cut.

9—The test should be made on one fuel. If it is desired to make the run on some other fuel, the change should be made just before starting the test, which will eliminate the necessity of including a small fraction of gasoline in the final results.

10—The total water used in the radiator, air washer and with fuel should be measured by the same method as used for getting the amount of fuel.

11—The observer who checks the depth and width of plowing also will check the speed at which the tractor travels. Allowance to be made for stoppage due to trouble.

12—The same plows with the same hitch and adjustments to be used throughout the demonstration without alterations.

NORTHWEST DEMONSTRATION

Walla Walla, Wash., May 2—Walla Walla's tractor, truck and power farming educational tests were opened in the presence of Acting Governor Louis F. Hart, representative of the United States Department of Agriculture and many prominent tractor and implement men from all parts of the Pacific Northwest. The demonstration grounds are some three miles from the heart of the business district, where a 600-acre ranch was loaned for the three-day exhibition. More than sixty types of tractors were on display. Each concern exhibiting was given an allotment of ground, and in many instances grades were from 10 to 70 per cent.

Perfect weather brought out an attendance of 65,000, who saw the various makes of tractors plow, disk and harrow 600 acres of land. Accessory exhibits were housed under canvas, and restaurants on the grounds fed 2500 persons an hour, or about 25,000 daily. Wells were sunk on the grounds which insured a plentiful supply of water. The demonstration was held under the supervision of A. E. Hildebrand.

BORING TRACTORS ON MARKET SOON

Rockford, Ill , May 5—The general purpose boring tractor is getting into production and will be on the market by June 1. The Boring Tractor Corp. has built a new fire-proof factory which will be occupied during the present week. The new factory is a made stone building, 70x200 ft., monitor construction, and will have a capacity of about 300 tractors a year.

The Boring tractor is a two-wheel, general purpose tractor of two-plow capacity and is designed to perform the general work of the farm for which the ordinary tractor is not so well adapted. The model which will be produced shows a number of improvements over former experimental machines, including a new and simple power lift for the plows and enclosed chain drive. Agency connections have been made and the full output of the factory speedily will find itself in the hands of dealers.

AVERY TRACTORS FOR A QUARTER

Peoria, Ill., May 5—The Avery Co. is distributing a toy in the shape of a miniature Avery tractor. It has wheels that turn "an' everything." The youngsters will enjoy it, unless it is too attractive as a desk ornament for their elders. Avery sends it for 25 cents.

MORE ROOM FOR SAMSON TRACTOR

Janesville, Wis., May 3—Contracts were awarded Thursday by the Samson Tractor Co., subsidiary of General Motors Corp., for the construction of the second unit of the new tractor plant at Janesville, Wis., where a total investment of $4,500,000 is contemplated. The first unit, 200 by 500 feet, was finished late in March. The second building will be an exact duplicate of the original unit. When it is completed, the assembling of Samson tractors will be done by the endless chain method. Immediate construction at Janesville also contemplated a third unit, which probably will be erected in August or September. J. A. Craig is general manager.

EDITORIAL

Selling Service

SELLING an automotive machine and the service that it requires constitutes a complete sale. We sometimes wonder if every sales organization follows this golden rule. Or do not salesmen often represent service as something for nothing to fatten their own pocketbooks. Surely they do not swell the company profits or lessen the service manager's grief, by such a transaction.

DID it ever occur to you that service is purely a business proposition and should be presented as such? Study the business of the prospective purchaser. Every business has a department paralleling the service department of an automotive institution. It charges for service-work done and so should you. Now compare your own organization to that of your prospective purchaser as a sales argument. Talk real facts. Explain the financial outlay involved in olding building space, equipment, mechanics, and extra parts in reserve so that service can be rendered as efficiently as possible 90 per cent of the time. Sold service is satisfaction.

Organized Service

SERVICE has become a technical problem. Undoubtedly it holds just as bright a future for the technically trained man as the development of an original design. Yet designers and engineers interested in the development phase of the industry have had an organization in existence since 1907 for the collection and distribution of information pertaining to their own field. The S. A. E. has accomplished a most important work.

SUCH an organization founded on a national basis is urgently needed by service executives. It is quite probable that the exchange of ideas would do wonders for countrywide service. Possibly the well organized S. A. E. could undertake this work as service is one of the important issues of the industry which it serves. Sooner or later maintenance will establish itself on its own level with the other important phases of the industry and the sooner this change occurs, the better it will be for automotive business conditions.

Need Roads That Stand the Traffic

MUCH as we may congratulate ourselves that the people generally have awakened at last to the necessity of spending money for hard-surfaced roads, we must be on guard that the new roads be built to stand the traffic that must come upon them.

THERE is grave danger that the experiences of some localities will be repeated, and instead of building roads that will stand the normal traffic the construction will be designed for light roads. Then we will see again legislation which limits the loading of vehicles which may use the road.

ROADS should be strong enough to hold up under heavy truck traffic. It is just as foolish to build light roads and keep heavy trucks off them as it is to ask the railroads to run their enormous locomotives on the light rails that were used 25 years ago.

Supervising Mechanics

THE other day an expert mechanic, one who has rebuilt many makes of cars and has 12 years of experience refused a position as manager of a service department. His excuse was a perfectly conscientious one: He had worked for years to make himself efficient in his trade and now when he had reached that point the manager wanted to take him from it and make an executive out of him. He had never been an executive and had no confidence in his ability as such. He had efficiency and also confidence as a workman.

TOO frequently in service buildings the owner makes the serious error of picking out his best workman and making him the executive head of the shop. No effort is taken to see if he is an executive. The workman may have executive ability and he may not, but the manager has not even thought of that. This is a serious error and in it is found explanations for much of the complaint against service ogranizations. The good mechanic to advantage can be made mechanics' superintendent or supervisor of every job that goes through the shop so that the management will know that the job has been properly done. This seems to be the job that the expert workman is best fitted for and where he would be the biggest producer for his employer.

LOOK at this under further analysis: Such an expert mechanic as supervisor would be a great money maker. During the day he works on or looks over two dozen jobs. Before a difficult job is to be started, he advises the workman just how to carry on the job; tells him best how to do certain parts of it and gives other suggestions. Once or twice while the repair is being made, he stops for a minute or more to see that the work is being properly carried out and also that the requisite speed is being made. When it is nearly completed he sees that everything is being done as it should be done so that when the job is handed over to the owner it is a real job and the service station knows that it is going into the hands of the owner as it should go.

IN such a position the expert mechanic, under the direction of the service manager, uses his ability to the best possible advantage to the service station. If the manager is a real executive he will be able to get the supervisor to give the needed attention to every job that passes through the shop.

Strikes Cut the Output

Labor Troubles in Plants of Parts Makers Decrease Production

Ford Plant Is Hit by Electric Walkout

DETROIT, May 5—Labor trouble in Detroit continues to grow in scope. On May 1 twenty-six unions filed demands for more wages and less working hours.

The outlaw United Automobile, Aircraft and Vehicle Workers of America called strikes in several plants. Altogether, approximately 12,000 workers of different unions went on strike at the plants of Wilson Body Co., Liberty Starter Co., Detroit Brass Works, Murphy Iron Works, L. A. Youngs Industries Co., Bowen Products Corps., Aluminum Castings Co., Commonwealth Brass Co., Solvay Process Co. The men returned to work when general wage demands were met by the respective companies. Strikes in seven out of thirteen foundries still continue.

While the United Automobile, Aircraft and Vehicle Workers of America are strongly organized in Detroit, attempts of this organization to form a local in Flint, home of Buick, Chevrolet, Dort and Paterson companies and scores of other automotive concerns, last week met with a rebuff.

In the Detroit situation, however, it is apparent that labor's indirect attack is at the Ford Motor Co. The walk-out in the Liberty Starter Co.'s plant, practically halting all work, has cut the Ford company out of starting devices for its sedans and coupes. The Liberty Co. is devoted exclusively to the manufacture of starters for Ford cars. The Wadsworth Mfg. Co. is working entirely upon Ford sedan and coupe bodies. Its production has dwindled from 250 bodies daily to less than that number in three weeks. The Wilson Body Co. is also making Ford bodies in large numbers and its production has been badly hampered.

At the present time, strikes have not affected the motor car companies directly, being confined entirely to parts and body makers. Some of the motor car plants have had a little trouble in some departments but it was only temporary and production was not materially affected.

HUDSON PRICE REDUCED

Detroit, May 5—A price reduction of $225 has been made in the seven-passenger Hudson Super-six. The price now is $1,975 instead of $2,200 and the other body models have been reduced on a corresponding scale. In connection with this announcement, there is also the anouncement of a number of refinements in detail.

The springs have been modified and longer shackles used to give a flatter suspension and better riding qualities. The frame has been increased to 7 in. in depth and a new square cross member has been added in front of the gasoline tank at the rear of the chassis for greater rigidity. The strength of the rear axle has also been increased. There is a stronger ring and pinion gear and an improved adjustment of the ring gear. The wheels have solid rims and the tire equipment is now 34 by 4½ in. on all models. The front and rear wheels now have twelve spokes.

The brakes have also been enlarged, the former size of 14 by 2 in. having been increased to 15½ by 2½ in. There have also been a few detailed changes such as a larger horn.

WALK-OUT AT OVERLAND

Toledo, Ohio, May 5—About 7,500 unionized employees of the Overland plant and 800 of the Electric Auto Light Co., an Overland subsidiary, are reported to have quit work at 3:30 this afternoon, defying the orders which had been issued, to stay on the job until 4 p. m. Five hundred women, employed in the upholstering, sewing and mailing departments were included.

Vice President Clarence A. Earl declared that every one of the employees who walked out had lost their jobs.

NONNES BUYS NORMA BEARINGS

New York, May 5—Walter M. Nonnes, who has been president and general manager of the Norma Ball Bearing Co. since its formation in 1911, on Saturday purchased all of the foreign controlled stock of the company at a sale of the Alien Property Custodian. A total of 1950 shares, valued at $500,000, thus becomes the property of Nonnes and his present business associates.

AMERICAN INCREASES CAPITAL

New York, April 30—The American Motors Corp. has increased its capital $500,000. In May, the company is scheduled to build 150 cars, in June 200 and in July and thereafter, 250 a month. P. W. Hansl has been elected vice-president and supervisor of sales. He was secretary and treasurer of the company for years. George G. Gates succeeds him as secretary. Robert Bursner remains president and Louis Chevrolet first vice-president.

BRISCOE TO DESIGN FRENCH CAR

Detroit, May 2—Benjamin Briscoe, Briscoe Motor Corp., has been elected a director of the Bellanger Freres, a large manufacturing concern of Paris, France, and will design a moderate-priced car for the French company along French lines but of American parts to a large extent. He has opened an office in Detroit and has with him Rodolphe Stahl, an engineer who has been associated with him in his companies for nine years.

Mr. Briscoe has not severed his connections with the Briscoe Motor Corp., of which he is one of the principal stockholders, a director and a member of the executive committee.

FORD ENGINE NO. 3,000,000

Detroit, May 2—Ford is now running 3000 cars daily. Approximately 300 cars are assembled daily at the factory branch for Detroit and Michigan trade. April 8 the company completed model T engine No. 3,000,000. The first model T engine was cast in 1908 and has been changed but little since that time. There are now approximately 3,150,000 Ford engines in operation.

Federal Highway Body

United States Chamber of Commerce Asks for Government Road Action

Business Men Ask Revision of Industrial Laws

ST. LOUIS, Mo., May 2—Establishment of a Federal highway commission, appropriation of Federal funds for building and maintaining highways, continuation of the Federal Road Aid Act beyond 1921 and expenditure of Federal funds for highways of a permanent type only, were advocated in the resolutions presented to the U. S. Chamber of Commerce by the Highways Committee of which F. A. Seiberling, president of the Goodyear Tire & Rubber Co., is chairman. The resolutions were approved and passed by the convention.

Major points developed at the convention held here this week by the United States Chamber of Commerce, which was attended by 1100 delegates from every section of the country and during which papers were read on practically every problem of industry were as follows:

Government, capital and labor must recognize that American industry is entering a new era in its history and there must be complete revision of laws, organizations and perspectives to accord with the new order of things.

Antiquated laws that have failed to keep pace with industry should be abolished.

There must be legal approval of co-operative industry or combinations, not for price fixing but for industrial progress.

There must be less government interference with business and more co-operative regulated control.

Railroads should be returned to their owners as quickly as Congress can pass legislation providing for government control of rates and for proper combinations and regulation. The American marine must be sold to Americans and distributed to provide bottoms for every section of the nation.

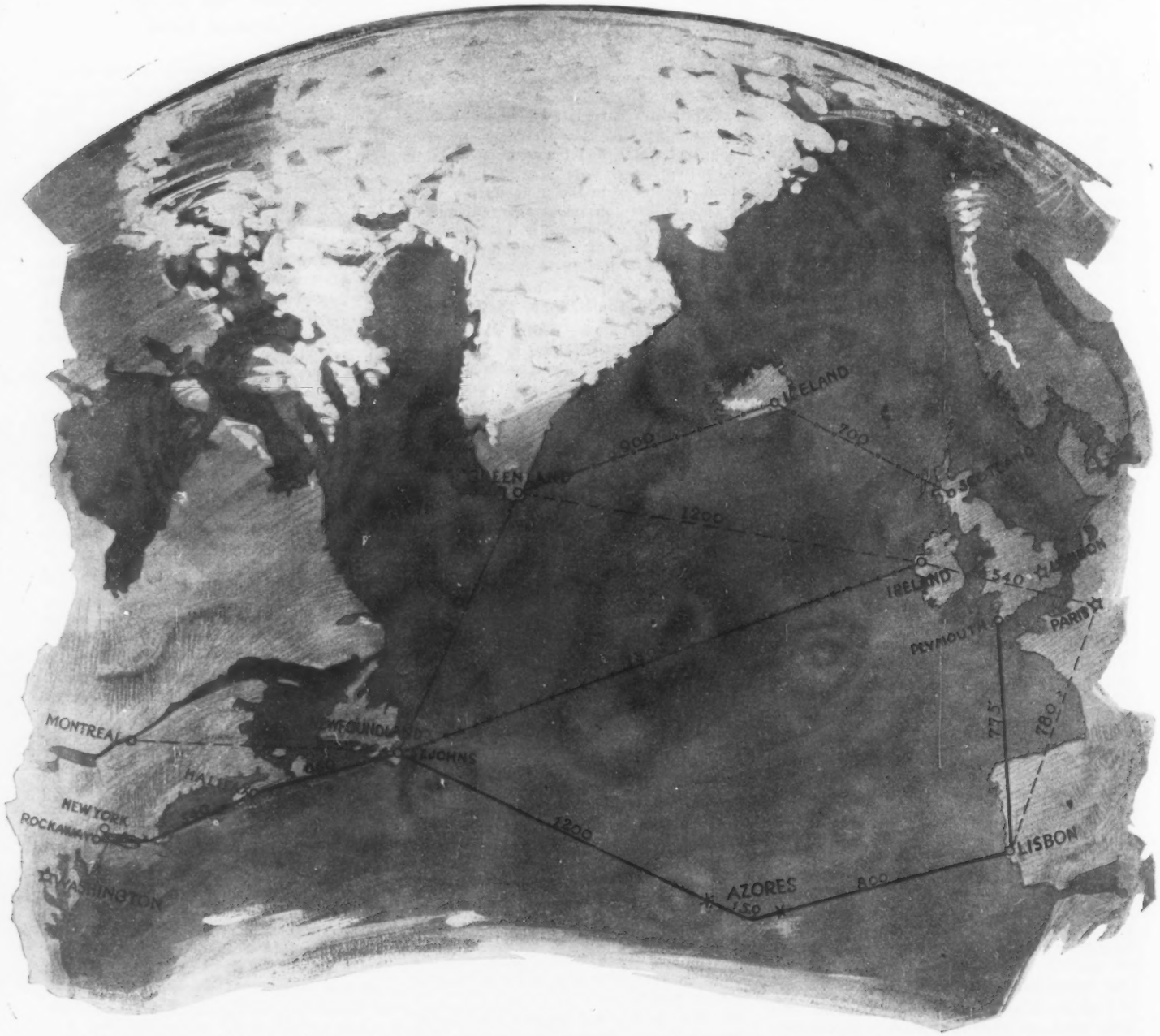
There must be recognition that a union of labor is as justifiable as a union of capital in the form of a corporation, and labor must be regarded under the new business ethics as a fellow servant with capital, and not as a commercial commodity.

JORDAN GIVES STOCK DIVIDEND

Cleveland, Ohio, May 5—Special telegram—Stockholders of the Jordan Motor Car Co. will receive 50 per cent stock dividend on both preferred and common stock under a plan approved at a special meeting to-day, increasing the capital to $1,200,000 preferred with 12,000 shares of no par value of common stock. Edward S. Jordan retains control and announced plans for new buildings with conservative increase in production. Jordan business totalled $8,000,000 on capital of $300,000. The late trade paper announcement of new models swamped Jordan with orders.

Air Routes of Trans-Atlantic Racers

How Aviators of U. S., England and France Are Bringing Europe and America Within a Day's Journey



The plot shows the three contemplated routes, with distances in nautical miles. The U. S. planes follow the Azores route, marked with the solid line. England is taking the straight route, while the northern route is that proposed by Prof. William H. Hobbs

FOR months past, before the armistice and with increasing keenness since, the burning question of the aeronautic hour has been: Who will be the first to actually cross the Atlantic by air from the United States to Europe? It has been the general belief that the four great nations, the United States, Great Britain, France and Italy, would try it almost simultaneously. Plans were kept secret for months, and a dozen were made public at once. To enumerate all would be another story. Some time ago it was conceded as true that five or six British airplanes either were already at the chosen starting point, St. John's, Newfoundland, or on their way there. America has announced its route, that of Great Britain, while not announced, is outlined in public opinion, and the others are more or less problematical. The three routes shown on the map are:

1—The United States flight: From Trespassey, Newfoundland, to the Azores, then to Lisbon, Portugal, and from there to Plymouth, England, with the distances in nautical miles as given on the map. Three NC planes have been in process of grooming for the jump-off together from Rockaway. Commander John H. Towers, in command of NC seaplane division No. 1 at Rockaway, made public the route as follows:

Naval air station, Rockaway to Halifax,

Nova Scotia, distance 540 miles; Halifax to Trespassey, 460 miles; Trespassey to Horat, Island of Fayal, Azores, 1200 miles. If conditions are favorable, seaplanes will continue to Punta Del Gado, 150 miles. Total distance from Trespassey to Punta del Gado, 1350 miles. Punta Del Gado to Lisbon, 800 miles. From Lisbon it is expected to proceed to Plymouth, 775 miles. The average speed of the seaplanes, disregarding wind, will be about 65 nautical miles an hour.

2—The British flight: No official word is available at this writing as to British plans, though something is known of the proposals made by various entrants for the Northcliffe prize of $50,000. These are that none of the transatlantic planes, unless it is a seaplane, will attempt to cut the nonstop distances by flying to the Azores, thence to Portugal. The seaplanes even are considered more likely to take on fuel from a naval supply ship stationed on the course than to pass by the Azores, as was once planned. The distance from St. John's to the nearest point on Ireland is about 1,800 miles, while to the first island in the Azores it is between 1200 and 1300.

Azores Route Possible

However, there is a possibility that official British flights will be on a route similar to that laid out by Maj.-Gen. William Brancker, comptroller-general of equipment of the British air council and head of the Royal Air forces, last summer. This route also is shown and is by way of the Azores.

3—The third route is proposed by Prof. William H. Hobbs as a substitute for the Newfoundland to Ireland route and the Azores route. This third, or fourth, route is divided into three nearly equal laps: Newfoundland to southern Greenland in the neighborhood of Cape Farewell, 700 miles; southern Greenland to Iceland, 900 miles; and Iceland to northern Scotland, 700 miles.

Six possibilities of final success are seen in the contestants for the Northcliffe prize and six in the American and British air services. Two of those for the British are airships, one of which is considered capable of making the crossing any time weather is not too unfavorable and which remained in the air 19½ hr. during a severe storm. In addition the British have a Sopwith with two-seater biplane with a 375-hp. Rolls-Royce engine with Harry G. Hawker, the Australian winner of the British Michelin prize for 1912 by a continuous flight of 8 hr. 23 min., as pilot. The flying boat "Porte" also has been shipped to Newfoundland. This comes from the government workshop and is considered by some at least as the British official attempt.

French attempts are thought to center around a large type of land machine being built by the Farman company, if it is not already completed. Caproni undertook a triplane for Italy's attempts, though no definite time has been set for the initial test.

Arranges Commercial Plane Distribution

NEW YORK, May 2—The Curtiss Aeroplane & Motor Corp. has entered upon the production of aircraft for commercial purposes and has so far completed its arrangements as to establish eleven distributers in the United States and several in foreign countries. Sales headquarters have been opened here under the supervision of J. P. Davies, formerly an officer in the U. S. Air Service. Distribution will follow closely the plan of Willys-Overland with which the Curtiss is affiliated. Following are the principal distributers and their territories:

American Trans-Oceanic Co., New York—Greater New York, Long Island, Westchester, Rockland and Fairfield Counties, Connecticut, Hunterdon, Somerset, Middlesex and Monmouth Counties, New Jersey, and Florida. P. L. Freeman is manager.

Curtiss Eastern Airplane Co., Philadelphia, Pa.—Pennsylvania, Maryland and Delaware, and Cumberland, Salem, Gloucester, Camden, Mercer and Burlington Counties, New Jersey.

Curtiss Southwest Airplane Co., Tulsa, Okla.—Oklahoma and northern Texas.

Curtiss Northwest Airplane Co., Minneapolis, Minn.—Minnesota, Montana, South Dakota and North Dakota.

Curtiss Tri-State Airplane Co., Memphis, Tenn.—Tennessee and Arkansas and northern Mississippi.

Curtiss Humphreys Airplane Co., Denver, Col.—Wyoming, Colorado, Utah and New Mexico.

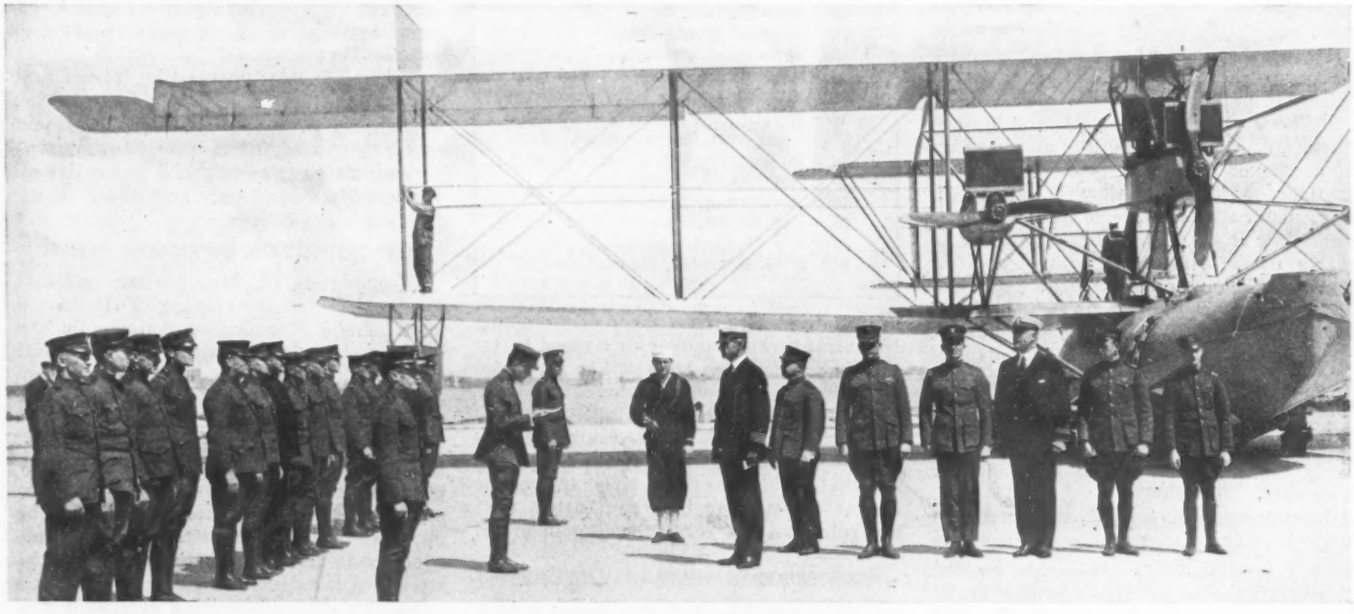
Curtiss Aircraft Co., Atlantic City, N. J.—Cape May, Atlantic and Ocean Counties, New Jersey.

In addition to these distributers have been appointed for Norway, Sweden, Finland and the Philippine Islands. George W. Browne, manager of the Overland agency in Milwaukee, and the Gibson Co., Overland dealers in Indianapolis, have been appointed local Curtiss dealers. A branch office has been opened in Chicago with George W. Browne as western representative.

Curtiss has adapted several planes for commercial uses. Among these are the JN-4D-2 type used almost exclusively for training purposes by America and Canada; the MF flying boat; the HS-2L flying boat; the H-16-A flying boat; the 18-B land machine and a new three-passenger plane which has been developed particularly for passenger service and which is styled the Oriole.

It is expected that within a short time several used machines of the JN type will be placed on the market at from $2,000 to $5,000. Prices of the other models have been set as follows:

MF flying boat	$10,000
HS-2L flying boat	25,000
H-16A flying boat	40,000
18-B land plane	25,000
Oriole land plane	7,500



U. S. Navy transatlantic seaplane ready to leave Rockaway Beach for flight to Europe. Commander T. Towers, officer in charge of N-C planes, and his crew

Rickenbacker Probable Indianapolis Race Referee

Entries Closed with Forty-Three Named—Only Thirty-Three Can Start

By Darwin S. Hatch
Managing Editor Motor Age

INDIANAPOLIS, Ind., May 5—Racing fans again will see Rickenbacker on the speedway which he left to win in the air the honors of two continents and the title of America's Ace of Aces. This time, however, he will not be at the wheel of a speed chariot, but an official, if he accepts the invitation of the Indianapolis speedway people to referee the 500-mile Liberty Sweepstakes, May 31, inaugurating the post-war revival of racing in America. Though Rick has not filed his formal acceptance of the honor as yet, this is regarded as practically certain by those who know his deep and abiding love for the motor racing sport, and are aware of the close friendship that exists between himself and the Indianapolis speedway management.

Captain Rickenbacker is the industry's war hero, and also one of the best-known drivers of race cars that America ever produced. Since he forswore the speed game to don an Army uniform, and succeeded in knocking twenty-six Boche planes out of the sky, he announced that he would forsake his former love in the field of automotive sport and permanently abide with the new, in which he achieved his greatest honors. Being the referee of a big race is just about as popular a job as umpiring a hotly contested ball game, and there are few men in the United States qualified to handle the contest.

Entries Close with Forty-three Named

With forty-three cars assured, and the possibility of one or two more being added, the entry list for the Indianapolis 500-mile Liberty Sweepstakes on the Indianapolis speedway, May 31, went over the top at closing time with one of the largest fields in speedway history, being excelled only by the record array of 1911, with forty-six cars, and the field of 1914, with forty-five.

During the closing hours seven cars were added to the already formidable list of thirty-six previously named. At the eleventh hour Gaston Chevrolet and Joseph Boyer, Jr., came into the fold at the wheel of a pair of Frontenacs; C. W. Johnson, president of the Uniontown, Pa., speedway, nominated a Jay-Bee Special, to be steered by P. W. Monahan, a newcomer to racing ranks; and Ray Howard, of New York City, another novice, sent in his entry of the Peugeot car in which Dario Resta won the 1916 driver's championship.

The expected entry by the Indianapolis Motor Speedway of two Premiers and another Peugeot also materialized at the last minute, though no drivers have as yet been named for these cars, and it is not likely that a selection will be made for some time.

Only thirty-three contestants out of the forty-three nominated for the Indianapolis 500-mile Liberty Sweepstakes, May 31, will be permitted to start in the contest, an American Automobile Association rule that limits the number of cars in any speedway race to one for every four hundred feet of track preventing the start of more than that number.

Time trials will be held at the Indianapolis speedway beginning May 27th to determine the final field that will face the barrier for the big Hoosier classic. Each contestant will be given three opportunities to show his speed, in a single circuit of the 2½-mile track, and the fastest thirty-three will survive, the best lap out of the three counting the final standing. No entrant who cannot show a speed better than eighty miles an hour will be permitted to start, however, whether he survives under the above conditions or not.

Starting positions for the contest will be awarded in the order of the speed shown by contestants in their time trials, the fastest car starting in first position, next the pole, and the rest following in order.

INDIANAPOLIS ENTRY LIST

1. Cliff Durant, Chevrolet special.
2. Ralph Mulford, Frontenac.
3. Jean Chassagne, Sunbeam.
4. Dario Resta, Sunbeam.
5. W. W. Brown, Richards Special.
6. Jules Goux, Peugeot.
7. Louis Chevrolet, Frontenac.
8. Gaston Chevrolet, Frontenac.
9. Joseph Boyer, Jr., Frontenac.
10. Earl Cooper, Stutz.
11. Tom Milton, Duesenberg.
12. Eddie O'Donnell, Duesenberg.
13. Dave Lewis, Duesenberg.
14. Kurt Hitke, Roamer.
15. Eddie Hearne, Durant Special.
16. Louis LeCocq, Roamer.
17. Ralph DePalma, Packard.
18. Eddie Pullen, Hudson Special.
19. H. C. Simmons, Hudson Special.
20. Ira Vail, Hudson Special.
21. Denny Hickey, Hudson Special.
22. Not Named, Hudson Special.
23. Arthur Thurman, Thurman Special
24. Wilbur D'Alene, Duesenberg.
25. E. L. Shannon, Mesaba Special.
26. Tom Alley, Bender Special.
27. Roscoe Sarles, Oldfield Special.
28. Arthur Klein, Peugeot.
29. Andre Boillot, Baby Peugeot.
30. Not Named, Peugeot.
31. Rene Thomas, Ballot.
32. Albert Guyot, Ballot.
33. Jules Bablot, Ballot.
34. Louis Wagner, Ballot.
35. A. E. Cotey, Ogren Special.
36. J. J. McCoy, McCoy Special.
37. Omar Toft, Darco Special.
38. P. W. Monahan, Jay-Bee Special.
39. Not Named, Detroit Special.
40. Not Named, Premier.
41. Not Named, Premier.
42. Ray Howard, Peugeot.
43. J. M. Reynolds, Hudson Special.

UNIONTOWN HAS 16 ENTERED

Uniontown, Pa., May 5—With nearly a score of drivers already entered, the third annual Grand Opening of the Uniontown Speedway which inaugurates the American Automobile Racing Season on Saturday, May 17, promises to be by far the most successful meet ever held here. The main event will be the 100-lap, 112½-mile Universal trophy race for the Universal cup, competed for once each year and which was won by Ralph Mulford at the opening meet last year. Mulford and Louis Chevrolet each have won one leg of the cup which becomes the permanent possession of the driver who wins it three times. In addition to the motor car racing, there will be a flying circus. An all-day program of varied features is being arranged and already special trains have been secured which will accommodate thousands of patrons from all over the country. Sixteen entries have been made to date.

THOUSAND PLANES TO BE SOLD

Buffalo N. Y., May 3—Plans to place in first-class condition and sell 1000 or 1200 used airplanes, purchased from the war department, were announced here by W. W. Moss, controller of the Curtiss Aeroplane and Motor Corp.

The planes were purchased for this purpose by the company and will be brought to Buffalo to be placed in first-class condition. They will be sold for pleasure and commercial purposes for $2,000 to $4,000 each, according to amount of usage and condition, Mr. Moss said.

The machines purchased are of the JH4 type, equipped with OH5 motors. Most of them have been used for training army aviators. They are double seaters.

STANDARD AIRCRAFT LIQUIDATING

Elizabeth, N. J., May 2—The Standard Aircraft Corp is winding up its affairs preparatory to going out of business. It does not feel that commercial aircraft is getting sufficient support at this time to warrant its continuation. The parent organization commenced work in 1914 and the present company was organized in 1915 to manufacture aircraft exclusively and was active all through the war.

BLOOMINGTON OPEN-AIR SHOW

Bloomington, Ill., May 3—Rain and cold weather marked the opening of the annual show of the Bloomington Automobile and Tractor Association, held on the court house square May 1, 2 and 3, but the two closing days were more agreeable and the show was the success hoped for. Twenty-three of the twenty-four firms in Bloomington took space, showing the unanimity of the association. The one exception was unable to secure any cars to exhibit. The city and county authorities cordially cooperated in turning over the sidewalks and streets to the dealers.

An extensive advertising campaign was conducted and the attendance of farmers and others from outside counties was large,

especially on the closing day, Saturday being the day when the average central Illinois farmer doffs his overalls and dons his store clothes to go to town. There was room for 132 machines and every foot of space was taken. Each firm exhibited all the way from three to twelve cars, a charge of $10 per car being fixed to cover the expense of advertising, decorations, illuminations, etc.

PERFEX GETS GOETZ AS RECEIVER

Milwaukee, Wis., May 5—At the first meeting of creditors of the Perfex Radiator Co., Racine, Wis., Julius J. Goetz of Milwaukee, previously appointed receiver, was elected trustee under bond of $50,000. A court order was filed authorizing the trustee to continue and operate the business for 30 days. The Perfex plant has been in operation since bankruptcy proceedings were filed March 28. It is believed that creditors will succeed in effecting a reorganization and that they will realize practically 100 per cent on their claims.

GEAR MAKERS IN NEW BRANCHES

Cleveland, O., May 3—The Van Dorn & Dutton Co., manufacturer of gears, has opened branch offices at New York and Chicago. At both cities it is purposed to specialize in gears and pinions for electrical work. Harry F. Keegan, formerly with the Chicago Surface Lines, will manage the Chicago branch. His brother, John Keegan, formerly with the Interboro Railway, will manage the New York end.

YOUNG INDUSTRIES BRANCHES OUT

Detroit, May 2—L. A. Young Industries, Inc., has purchased the factory of the Borden Milk Co., Jackson, Mich., with 150,000 square feet of floor space and will announce shortly the purchase of another plant in the state. Both of these factories will be operated as part of the wire division of the company and men and machinery will be removed from Detroit to operate them. The company has taken this action owing to labor troubles, labor being less restless throughout the state than in Detroit.

BRISCOE CARBURETER MOVES

Pontiac, Mich., May 2—The Briscoe Carbureter Co. of Jackson is about to move to Pontiac. Frank Briscoe, former motor car manufacturer, is at the head of this company which is now producing carbureters on a small scale. Ground has been broken here for the new plant. It will be a one-story strictly modern concrete structure, 60 by 200 ft. in size. The plant is to be completed and in production within the next 70 days. About forty men and women will be employed at first. The Briscoe carbureter is designed principally for use on Ford cars.

VACUUM FEED UP AGAIN

Chicago, May 5—That the patents of Fred Weinberg, Detroit, for fuel feeding are not an infringement on the Webb Jay patents on the Stewart vacuum system was the substance of the decision handed down April 30 by United States District Judge Sanborn. A year ago Judge Sanborn handed down the same decision, holding that the Stewart-Warner patents are valid, but not infringed upon by Weinberg. The Weinberg method of fuel feed is called the Thermo system.

SPOHN RETURNS TO C. J.

New York, May 5—After something over 2 years spent as commercial manager of the U. S. Ball Bearing Mfg. Co. in Chicago, Howard L. Spohn has returned to the Class Journal Co. Mr. Spohn was connected with the Class Journal Co. for the 7 years previous to his going West and upon his return to New York he takes up the same general duties he was performing prior to his venture in the manufacturing world.

HARRY STUTZ SUBSCRIBES $250,000

Indianapolis, Ind., May 5—The Indianapolis motor trade is going strong on Liberty loan subscriptions, the largest individual purchase in Marion County in the five loan campaigns being that of Harry C. Stutz, president of the Stutz Motor Car Co., who took $250,000. The Nordyke & Marmon Co. also took $250,000. This amount does not include that taken by officers and employees of the company.

TRAFFIC DEALERS GATHER

St. Louis, May 7—Dealers began arriving to-day for the Traffic Motor Truck Corp. convention, which will be held here Friday and Saturday. Dealers in twenty-one states have been invited. Headquarters will be at Maryland Hotel. Business sessions will be held at the new factory and an opportunity will be given dealers to closely inspect every feature of the production plant. There will be a dinner Friday evening and a banquet on Saturday night.

CHICAGO TRADE GOES BIG ON LOAN

Chicago, May 5—Chicago's motor row has subscribed 70 per cent of its $2,300,000 quota in the Victory loan. It is expected that the row will easily complete its allotment in the six days remaining before the drive is finished. The Studebaker Corp. of America heads the list of subscribers with a total of $255,000 followed by the Ford Motor Co., Goodyear Tire & Rubber Co., Buick Motor Co., B. F. Goodrich Co. and a few others, all of whom have subscribed in excess of $35,000.

PHILLY TRADE PLEDGES $3,110,000

Philadelphia, Pa., May 5—Special telegram—The total Victory loan subscriptions to date, of the industrial group, comprising motor car and allied lines, is $3,110,000.

MAXIM IN MILWAUKEE

Milwaukee, May 2—The Grouder, Paeschke & Frey Co. is now manufacturing the Maxim silencer formerly manufactured by the Maxim Munitions Corp.

GENERAL MOTORS AGAIN TO EXPAND

New York, May 5—General Motors likely will become a billion dollar corporation. At the meeting of the board of directors in Wilmington last week, President W. C. Durant stated that the board of directors had recommended an increase in the debenture stock to $500,000,000 and in the common stock to $500,000. The increase will be passed upon at a special meeting to be held on June 12. W. P. Chrysler was elected first vice-president and H. H. Bassett was added to the board of directors and appointed general manager of the Buick division. Both Bassett and F. W. Hohensee, general manager of production of the Chevrolet division, were elected vice-presidents.

ALLEN OFFICES TO COLUMBUS

Columbus, O., May 3—The sales and advertising departments of the Allen Motor Car Co. have been moved from Fostoria, to the new location at Columbus. R. G. Swell is in charge of both departments. The interior of the plant taken over by the company is being remodeled.

ANTHONY DISTRIBUTES DORT

Los Angeles, Calif., May 3—Hereafter the Earl C. Anthony Co., Inc., will handle Dort distribution on the Pacific Coast. This company succeeds the Frawley Motor Car Co. of San Francisco and the Leach Motor Car Co. of Los Angeles as distributers. The headquarters of the Anthony company are in Los Angeles but the firm maintains seven branches throughout the state, being represented in San Francisco, San Diego, Fresno, Stockton, Sacramento, Oakland and San Jose.

WILLIAM HYSLOP DIES

Toronto, Ontario, May 2—William Hyslop, president of Hyslop Brothers, Ltd., died suddenly Saturday of influenza. Mr. Hyslop was a founder of one of Canada's oldest automotive trade houses. For years the company has distributed the Cadillac over a large area and is one of the dominion's largest jobbers of automotive equipment.

FREDERICK ROBINSON DIES

Racine, Wis., May 2—Frederick Robinson, director and former vice-president of the J. I. Case Co., Inc., passed away at his home in Racine April 22. He was born in Kenosha, Wis., Nov. 15, 1862. The first position that he held was as office man in the office of the old National Vehicle Co. of Racine. In 1887 he went to Denver, Colo., where he engaged in the structural iron industry for several years.

In 1896 he returned to Racine and became purchasing agent of the J. I. Case T. M. Co. In 1898 he was one of the purchasers of the entire stock of the company and was elected vice-president and general manager. In 1914 he retired as vice-president, but remained on the board of directors.

TO MANAGE SCHEBLER SALES

Indianapolis, Ind., May 5—Earl A. Stone, formerly manager of the Detroit branch of the Wheeler-Schebler Carbureter Co., Indianapolis, Ind., has been appointed sales manager of the company to succeed George T. Briggs, who joined the Sinclair company.

Roads as Service Advertising Medium

Highway Signs Are Business Getters —*if* Brains Are Mixed with the Paint

By T. P. Bowman

Fig. 1—The best sign in a group noted in one day

ONE means of drawing business to the service station and repairshop largely is overlooked, and when attempt is made to take advantage of it so little thought is put upon its use that results often are worse than useless. This means is roadside signs. The highways are the arteries of business for garage or service station. It is logical then that such customers best can be made acquainted with the stock in trade of service stations by telling it to them on the highways.

Road signs are the means by which this is done. Use road signs freely—but use them intelligently. On a one-day trip last fall the writer watched for signs and saw perhaps a dozen or so. I made note of the best one of the bunch, which is represented in Fig. 1. The rest were much worse in appearance. The name of the garage is fictitious, the remainder is identical. Half a dozen boards carelessly nailed to two crosspieces and sunk in the mud. It was out of shape and uncared for.

Let us take a moment to analyze this advertisement: Its construction is solid but out of proportion; its appearance is representative of its construction, untidy, void of all attractiveness, and it has the aspect of a hay-wire job from beginning to end. Then there is the reading material. "Johnson's Garage" without anything else appearing on the board would have done the concern more justice. Johnson's Garage in itself is significant of overhauling and repairing, and if it were not on there it would be assumed generally that service of that nature could be obtained there. Therefore, that amount of space has been wasted. The next remark, "We give the best service" means absolutely nothing. It hardly would be expected that they would advertise their worst service and so long as the service has been classified it is quiet natural the best service would be claimed. Then, to totally ruin whatever little good effect the sign may have had, "Our terms are the cheapest" is added.

In the first place the word "terms" generally is accepted as the manner in which an account is paid, either cash or credit, and usually applies to credit. "Terms" cannot assume the meaning of prices. The correction of this error, "Our prices are the cheapest," does not materially improve the expression. "Service" and "cheap" are not acceptable associates. Service does not signify cheapness. Service means getting what you want when you want it at a reasonable charge. Good service cannot be rendered at a cost less than that which will assure good service. Anything less is less service and the public avoids it.

Now that the publicity as illustrated in Fig. 1 is analyzed, we find the advertiser had a better chance of obtaining the tourists' business if he had not advertised. The tourist may have called on the Johnson Garage if he hadn't been warned before-hand by Johnson himself. Such is not publicity. It is a warning, and the advertiser must suffer regardless of whether the class of service he renders entitles him to the tourists' trade.

Fig. 2—Money and time spent wisely and well by advertisers

Good Publicity

What about the publicity in Fig. 2. What do you suppose the traveler's thoughts are when he sees a board of this type along the road? They easily can be imagined, especially if he sees it immediately after breaking down. The advertiser who adopts this type of publicity spends his time and money well and wisely. The classy appearance of the board is certain to elevate the character of the service in the minds of the public. It is considerable of a boost to the industry in general as well as to the owner of the service station it recommends. It is plain and simple in design but extremely neat. Its appearance is beyond criticism. It is very noticeable because it is very unusual in service-station road publicity.

Next, there is not so much said in the lettering of the sign that it cannot be

Fig. 3—A sign that really extends an invitation

easily read to the end, even in driving past at a good rate of speed, and when it is read it is certain to leave a lasting impression upon the mind of the reader. The concern which has taken the pains to arrange for the service and comfort of trade, providing a place of comfort with telephone service, is bound to be recognized. Regardless of whether this accommodation is taken advantage of or not, the idea cannot be expelled from the mind. The tourist cannot feel otherwise than that he is constantly in the care of that dealer as long as he is in his territory. The business manager who desires to be singular in his methods of service and feel assured that he will get the transient trade personally will interview each farmhome along the highway in his territory and arrange for the comfort of travelers in distress until relief can be sent. This will cost practically no more than the time required to do it and you have reached the heart of the tourist.

Going One Better

In Fig. 3 the service station can go one better. At the cross-road nearest the city a board constructed along the lines of that one shown may be placed in full view of the tourist. The board itself is slightly more elaborate in design and if sufficiently different from the others it has little chance of being mistaken for a duplicate of the first.

While there is very little doubt of one overlooking the service station which has advertised itself in Fig. 2, Fig. 3 is a change of subject in that it is really extending an invitation to the tourist who is not experiencing any road trouble. In this, one is asked only to accept all or a part of the free service offered by the concern. "Tourists' Service Bureau" can do nothing less than attract the attention, and "Hotel Reservations" and "Information" is bound to interest one. A tourist, to whom the country is strange, never fails to obtain a supply of information every now and then along the road, and he generally drives up to a service station to obtain any information regarding directions and road conditions.

Of course, if he does not happen to have the acquaintance of a certain station in the little city, he will stop at the first one he sees, but in this he has no assurance of the reliability of the information or service given. The concern whose publicity he reads, as in Fig. 3, really has assured him there is no better place to go because he apparently specializes in this branch of the service. Then there is the person who may find it convenient to remain in the city over night. Undoubtedly, he would ask as to the hotel service if he were unacquainted, but if he has read the publicity beforehand he realizes the concern has applied itself to satisfying his comforts not only by giving the required information but securing reservation for him the moment he arrives.

One need only make a single tour to realize the satisfaction of being able to obtain such service as this, and for this accommodation for the tourist what is the cost of it to the concern? And what is the profit derived from the investment? Small and great, respectively. Twenty of these attractive signboards can be installed along the main roads of travel at a cost of $20 each, representing in all an investment of $400. This represents the initial cost, and if they have been well constructed and properly erected they are good for at least six years with a maintenance cost of perhaps $100 during that time. The result is six years of the best publicity obtainable at a total cost of $500, or less than $100 a year. If these boards do no more than increase the business to the extent of a dozen tire sales a year, the expense of the publicity has been met, but the concern who is wise enough to see the value of such publicity is also wise enough to receive much more than the profit of a dozen tires.

Fig. 4—A placard for the service station

Fig. 5—A former invitation emphasized

Remember that getting the customer to the door is the secret of success in all lines of business and it is particularly true of the automotive industry. You can not sell a man anything if he does not come to your place of business, and very few come unless they want something. Your home-town friends know where you are and what you are, but the stranger doesn't. If you don't keep yourself always before the public in some publicity, your home-town friends are apt to overlook and forget you, and the tourist does not know you exist. Therefore, such publicity as that which is attractively placed along the road is valuable from all angles. Your home-town friends see it every time they take a ride, and the tourist sees it every time he takes a trip.

A Mistake Easily Made

There is one mistake easily made and often made, that of ceasing to hold the attention of the customer after you have got him. The greatest publicity in the world quickly will lose its effect if it is cut off too soon. For example, the tourist has been greatly attracted by the character of the publicity on his way to the service station, and he calls on you in all the confidence possible. He expects to receive as much or perhaps more attention than you advertised, but he will not be unreasonable. Ten chances to one he would not complain if he did not receive any of it, only he would lose confidence in you. Holding this confidence is the secret of the successful dealer, and this can be done in no other way than by doing all that you advertise.

Imagine a person driving into the service station and asking which of the hotels he should go to and finding you did not know or that you had not made an effort to reserve a room for him at a good hotel after being requested. Right at this point, the money which you had spent on the publicity which brought this man to your place of business is lost. It is lost because his confidence is lost. He not only loses confidence in your advertised service but loses confidence in you. Never advertise anything for the immediate accommodation of the public before you are prepared to offer it. Give the customer all the attention you say you will and then just a little bit more.

Several placards, such as Figs. 4 and 5, have a very good effect, especially in the case of the new customer, who has been attracted with the outside publicity. After arriving he still is being offered the comforts and service of the place, and he realizes there is something more to the courtesy of the management than that which brought him there.

Another placard, larger than those mentioned, is illustrated in Fig. 6. In this the idea is conveyed that the service you are rendering is based upon the wants and desires of the trade. The service apparently represents the ideas of the trade in that

WE INVITE CRITICISM
OUR SERVICE REPRESENTS ALL THAT
WE HAVE BEEN ABLE TO PROVIDE FROM
OUR CONCEPTION OF SERVICE.
IF BETTER SERVICE IS AVAILABLE IT MUST BE
SUGGESTED BY YOU
WILL YOU GIVE A SUGGESTION?

Fig. 6—Giving credit for service to desires of trade

you invite suggestions for the betterment of the service you are rendering, and it very often happens that a customer will suggest something which had been unthought of before and which is a very good idea. Do not hesitate to permit the trade to offer suggestions, because in so doing you can keep up the ideas of the customers' wants and you have the privilege of adding the idea to your present service or discarding it as you see fit. The customer invariably appreciates this opportunity.

Making Boosters

It is a wise management which will carry out its system upon this point, but the management which makes a booster of every stranger who calls is a wiser one. The tourist may come and go and be more than satisfied with the service and the treatment at your place, but the idea is to have your service known outside of the immediate territory. If the tourist has been treated well, he will not forget it for two reasons; the first being that he appreciated it and the second, that he unusually gets it. There is very little need of telling him to tell others of the service you have to offer, because he will do that anyway. But there is a way of making a conscientious booster of the stranger instead of just a booster.

Everyone realizes that if one speaks well of someone it is a boost, but the booster realizes too well that he in reality is drumming up business. Of course, there is no particular harm in this, in fact, it is really good as long as it lasts, but the fact that the customer is doing something for someone else with no apparent profit is apt to cause him to lose interest and forget you shortly afterward. There is the type of customer who regards you as fully paid for your advertising if he has called on you as the result of it. While he will be far from being a knocker, he will not be an enthusiastic booster.

To make boosters of this class of the trade, as well as to hold the interest of the other class, the object of your service must be presented to them from a different angle than that of operating according to specifications, or your own fast rule.

To realize how nicely and effectively this can be done, place yourself in the position of the satisfied customer who is just departing and has been handed a neat and attractive card such as in Fig. 6. Read it, and see how it has impressed you.

The customer has changed his mind about all the service you have given him. He at first realized that your service was exceptional and would not hesitate to recommend it as a matter of favor to you because he appreciated your efforts, but at the same time he also realized that he was favoring you to a certain extent in advertising it. Now, after reading your final publicity, his conception of everything that you have offered him has brought him to a different realization of it all. He will be a booster, that is true, but he will be a booster for himself, his own comforts and his own conveniences. Naturally, he is interested in receiving good service wherever he goes and he knows that unless some such plan is universally adopted, it is impossible. He also realizes that unless the car owner assumes an unusual interest in his own case your service always must remain an exceptional service, and he has learned that the one way to accomplish universal service is to advertise it.

When people throughout your territory and adjoining territories set your place of business up as an example for other service stations, you are getting real publicity, and when you can make the car owner realize that in boosting for you he is in reality boosting for himself you have won a victory in your own case, and furthermore, you are doing a wonderfully good turn for the uplift of the industry. Get the idea?

NOW FOR COMMERCIAL PLANES

Philadelphia, Pa., May 2—The Curtiss Eastern Airplane Corp. has been organized here with G. Sumner Ireland, formerly an instructor in Army aviation, as president and general manager. Four planes have been sold, two JN4's and two hydroplanes. A JN4 is now on exhibit at the salesrooms of the Buick Motor Co. The organization will include dealers in Baltimore, Princeton and Pittsburgh. The territory includes Pennsylvania, Maryland, Delaware and lower New Jersey. The concern will open two flying schools, one at Pine Valley and one at Gloucester, N. J., May 1. Hangars have been built already, and flying fields are provided for. A service truck to convey parts will be used to supply quick transportation from stations to fields, and a stock of parts will be maintained in the hangars.

Coincident with the opening of the corporation's offices, it is announced that hereafter new Curtiss models will be named after birds and insects. The new three-seated plane, orange colored, will be the Oriole; the new biplanes, the Wasp and the Hornet; the new seaplanes, the Petrel and the Seagull; the scout biplane, the Gnat; and the scout triplane, the Midge.

WOULD STANDARDIZE GASOLINE

Sacramento, Cal., May 2—Three bills to fix specifications for gasoline are now before the California legislature and it is expected they will receive due attention from the industry as a whole because of the widespread consequences which would result from misdirected attempts at legislation of this kind. The bills seek to define gasoline and fix a standard of quality. One also defines distillate, fixes a standard for this and provides for its coloring "in a manner sufficient to show clearly if one part of same is added to seven parts of gasoline."

The third is called "an act to prevent the manufacture, sale or compounding of adulterated or misbranded gasoline, benzine, naphtha, lubricating oils and greases, etc., and to regulate the traffic therein and providing for their inspection, analysis, standard grades and standard tests." These bills naturally are meeting with the opposition of the trade in California.

HOW THEY ARE BUYING CARS

Boston, Mass., May 2—A H. Sowers, who took over the distribution of Lexington cars for New England just before the motor show and opened his retail salesrooms show week, has sold thirty Lexington cars at retail; secured distributers at Worcester, Providence and Springfield, who have each taken fifty cars, making a total of 180 machines ordered in a little more than six weeks. Other dealers also are doing a fine business.

MY KINGDOM FOR A JITNEY!

Chicago, May 2—It's sad, but it's true. The royal chariot of the all-highest has been sold to a man in Berlin, who is going to use it for a jitney bus. And if Wilhelm ever goes home again, he'll find himself in strange company when he takes his former benzine cart for a ride down Unter den Linden. A common, vulgar auction did it. The car was dilapidated because of hard driving during the war, and now where once a trumpeter from the front seat sounded fanfares to announce that the all-highest was approaching, no doubt we'll have the megaphone-mouthed crier with "On the right, ladies and gentlemen, you see—" Anyway, it looks like William "gave up" his kingdom to get a ride in a jitney.

Garage Planning
Service Station Arrangements

Standard Plans for Plots of Certain Sizes

EVERYONE knows progress hinges largely on improved equipment. The enormous development of the last hundred years in all branches of activity is almost entirely a story of better and better equipment—even the new and startling inventions that have come in endless procession were made possible, step by step, by improvement in equipment of one sort or other, using the term in a broad sense.

Every garageman, dealer and repairman is interested in just one thing, greater profits. This is the mainspring of his endeavor—the reason why he is in business. Constantly increasing profits are his barometer of success. If he is simply standing still he is in danger; his business is not healthy. It is only when profits increase steadily from month to month and year to year that his enterprise may be considered to rest on a firm foundation. Increasing profits are not only an evidence of progress but also are based on progress. Progress must come first. Modern, efficient, adequate tools are the first essentials in this steady development, and the most necessary piece of equipment in the hands of dealer, garageman or repairman is the right kind of a building—more than that—the very best building possible to erect in the circumstances. Full measure of success is withheld in many cases because the dealer or repairman is forced to work with second-rate building-tools that are not 100 per cent.

Handicap of Poor Building

The dealer with a poor showroom or no showroom cannot cash in to the full extent on his skill because he is handicapped by improper equipment. The dealer or garageman without an accessory store is ignoring an opportunity, and if he tries to embrace it without having a store, his efforts cannot possibly be crowned with as great success as if he had that most essential asset to retail merchandising—a store. Likewise the garage ill-lighted, with poor elevators, or space badly arranged, is a millstone around the neck of any man who tries to rise by employing more efficient ideas in the operation of his garage. Similar remarks hold true for the shop and other departments.

The building itself, clearly, is the most expensive and most important piece of equipment. A system can be changed, more efficient tools can be substituted for less efficient ones and employees may be trained until they are satisfactory or new ones engaged but little can be done with the building itself. A new building, whether it is adequate or not, whether it is modern or not and whether it will assist or hinder progress to greater profits or not, costs about the same, and once erected little can be done to improve it. It is the most durable piece of equipment and to move to a better one, should it prove a handicap, is usually out of the question. It is an event of a lifetime for many.

Although little can be done to improve many of the existing buildings, it is imperative to make every effort to insure maximum efficiency in the countless structures still to be reared. Some may ask what architects are for if not to render this very service. The answer is that an architect knows, or is supposed to know, all about buildings, but he does not know anything about automotive business, and it is impossible to design the best building without a thorough knowledge of the requirements of the business it is to house. At the same time it is difficult and usually impossible for the dealer, garageman or repairman to supply just the information the architect should have. More than that, quite often a new building is the first step up the ladder of success, and it is not until the owner is well established in his new edifice that he begins other reforms, and with these changes for the better comes an increasing realization of the inadequacies of the new building—but too late!

There are certain well-defined principles which have been found best in laying out various types of buildings designed for the automotive business. It is out of the question for the owner or the architect to know these. In addition, it is next to impossible for the owner or architect to keep in touch with what is newest all over the country.

Clearly there is an unfortunate gap between the man in the automotive business who is planning to build and the architect, and MOTOR AGE is determined to fill this gap, as completely and adequately as possible and help each reader who contemplates building to obtain a structure best for his purpose. To fill this need MOTOR AGE inaugurated in the issue of March 13 its Garage Planning department.

The main function of this new department is to answer requests from readers, particularly requests for miniature plans drawn to meet the needs specified.

So, Mr. Dealer, Mr. Garageman or Mr. Repairman, when you get ready to build, write MOTOR AGE for expert advice on any problem connected with your enterprise.

If you want miniature plans, write us a letter telling us your idea of what you want and be sure to inclose a rough diagram showing the dimensions of the plot with adjacent streets and alleys marked. If the plot is on a corner, indicate which is the more important street.

What to Tell

Tell us, if you can, how many cars you wish to display in your showroom, how many desks you will need in your office, how many cars in garage and shop. Also give us a general description of your business so that we will be able to turn out the plan most suitable to you.

You will receive a prompt answer to your inquiry together with a blueprint of a plan which will be drawn especially for you.

If you want us to draw a front elevation of the proposed building, we shall be glad to do that also, but if your architect is competent, this can better be left to him.

Some of the plans drawn for readers that are of sufficient general interest will be published, but whether a plan is published or not the reader requesting it will receive a prompt reply by mail.

In addition, a series of standard plans for plots of standard size will appear in following issues. The word standard is used advisedly and by it is meant plans which are so general in their application they will meet the needs of many in the automotive business. Careful investigation shows a large percentage of buildings are erected on plots of approximately the same dimensions, and it further is found that the requirements of the businesses to be located on these similar plots are often quite identical. For example, a plot 50 ft. wide and 100 to 150 ft. deep is quite common and so MOTOR AGE will begin this series with an ideal dealer plan—garage, repair-shop, showroom, accessory store, etc.—for a plot of this width, and plans for other typical plots will follow.

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following informaton:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 44

Garage 120 by 220, Two Stories

Q—We expect to build a garage on a lot with 120 ft. frontage on Union avenue, extending back 220 ft. to Beale avenue. The lot is rectangular. There is an alley running on the east

side of this lot to a point within 90 ft. of Union avenue. This alley then turns at right angles and goes east. It is 14 ft. wide. Union and Beale avenues run east and west, and the building will front on Union avenue.

The elevation of the ground is such that the first floor on Union avenue is the second floor on Beale avenue, and an entrance from the alley midway of the building would go into the basement at ground level.

We expect to display as many as six cars. We expect to have in storage at times as many as fifty to sixty cars, or more. We will employ in our shop about fifteen men. We will only handle repairs for the cars we handle.

We should like to know your ideas as to whether we should locate shop on the second floor or in the basement and the layout as to how you would suggest arrangements for storage of cars in unoccupied spaces.—Union Motor Car Co., Memphis, Tenn.

First and second-floor layouts of garage for triangular lot

Your location is so ideal and you have so much space, we have only scratched the surface of possible arrangements in the layout we show. It has been the best practice to divorce as far as possible sales and service departments; consequently, we recommend using the Beale avenue front for your service department with a competent superintendent in charge. All your car repairing, tire repairing and battery and other electrical work can be done on this floor under good light conditions, reserving the rest of the floor, which is dark, for inactive storage, truck storage and the storage of cars undergoing repairs.

You have such good conditions for a ramp we think you should install one, as the inconvenience of going around the block to the basement would be considerable in bad weather. There are numerous places for a ramp, though its position should be chosen with a view to economy of space and making its approach as convenient as possible. Since it would be used to a great extent by cars seeking aid from the service department, it should land the cars near the office of the service superintendent. Of course, an elevator could be used instead of a ramp if considered more desirable, but a ramp is cheaper and more efficient, besides requiring very little upkeep.

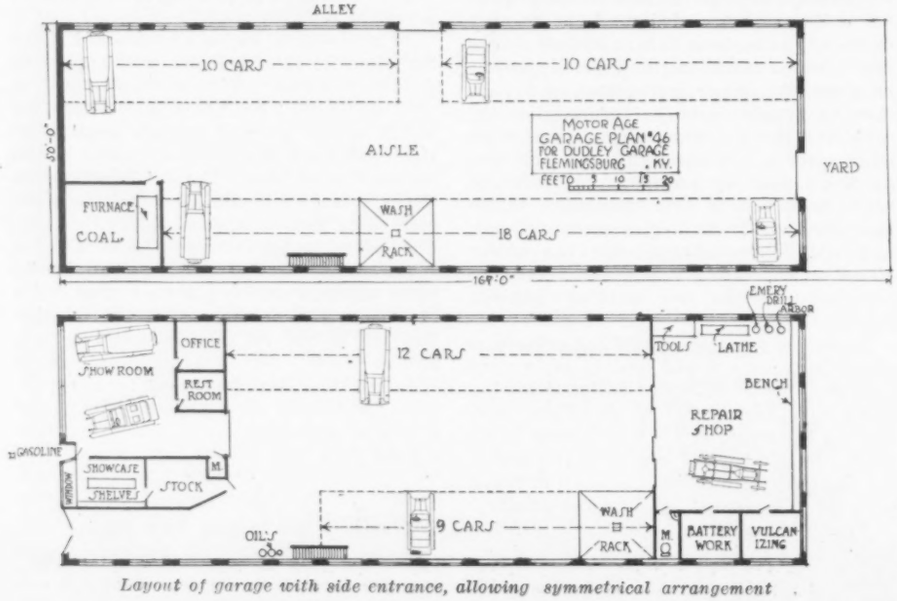
We have made the entrance on Union avenue wide enough for two cars to pass, as an entrance of this kind is sure to cause congestion from cars meeting other cars and having to back out.

The doors are 25 ft. back from the front of the building so this space can be utilized for accessory display which will be seen by people pasing on the street. The greater part of the upper floor is reserved for live storage, as it is light, convenient and accessible. This floor alone will accommodate nearly sixty cars, and it should be very popular with owners.

Body repairing, painting, and varnishing need all the light obtainable, so they should be done on this floor. It might even be advisable to reverse the whole main floor to take advantage of the windows on the alley side for these departments.

Gasoline and oil service should be provided on both fronts as a convenience to transients, though, of course, regular patrons soon would learn where to go for their supplies, whether fuel or parts.

A small basement for the heating plant is shown on the Beale avenue side with coal under the sidewalk. As this is the lowest point and with such extensive floors, drainage back to the boiler would be much better. The boiler room would be placed somewhere at the north end of the lower floor, though that would necessitate overhead heating coils or high wall radiators which give far less even heat.



Layout of garage with side entrance, allowing symmetrical arrangement

No. 45

Corner Garage with Room for Growth

Q—We expect to build a small garage, of brick, with full basement and heating plant. The first floor is to have an office and store in the acute angle of the lot, and the balance would be for garage proper. The second floor would be used for a paintshop. The building will have a frontage of 71 ft., less the 10 ft. wall, as the 71 ft. comes to a point. The east wall is 59 ft., 8 in., or about 60 ft. Show entrances and exits for cars, also space for battery work, charging, tire vulcanizing. We do not wish to have more than one toilet room, as the space is too small.—Northwestern Iron Works, Devil's Lake, N. D.

Why do you not build on the east end of your lot, say 50 ft. of it? In that way, you could get enough space to make it worth while. The great disadvantage of building on this small space is that you will have to do everything over when you enlarge, making lots of extra expense. Of course, you would lose some of the value of the corner location, as regards its proximity to the hotel and depot.

We think it wise to design your whole building, then build such parts of it as will not have to be changed. If you want the store on the front of the lot, build that part to its full and complete proportion. Use your old shop and garage as such until your new store is completed. It should have an elevator if you contemplate a second floor. This will enable you to use the new second floor for a permanent repairshop. Now build a storage section at the far end of the lot. This may very well be separated from the store and repairshop without much inconvenience.

When this is completed, you will have no

further use for the old building, and it can be removed. The remaining section, between the two buildings, can be built when storage and repairshop facilities are outgrown. Your old building is probably larger than the new one which you propose. Add to this the inconvenience of being cut on the bias and you will see how you are restricting yourselves.

Our layout is along the line we suggest, though the departments would be changed about to more nearly meet your needs. If you do more painting than repairing, it might be best to put all the repairshop in the basement, leaving the second floor for painting, or if there is room for both paint and repairshop on the second floor, then put the battery and tire shops in the basement.

The storage end of the building as shown would accommodate eighteen cars.

By following this method, very little remodeling will be necessary and you will have the foundation of a large future business. The elevator will take care of all future needs, and the store, heating plant, repairshop, etc., will need no changes of consequence.

Should you go through another winter before connecting the two buildings, heating pipes could be carried to the garage through a trench and this, too, could be permanent unless a basement was desired.

No. 46

Garage 50 by 167—Front and Roof Types

Q—We would like to have a complete summary of the advantages and disadvantages of the different layouts. We note there are three types of fronts—one with a center entrance and showroom on each side; one with a driveway on each side and showroom in center, and another with driveway at side, remainder of front being a showroom. We understand the plan with center driveway makes a better appearance from the front and has the advantage that cars drive directly into the center aisle between the parked cars, but the disadvantage is that the show space at front is divided into two sections and it is inconvenient to get from one room across the driveway and into the other room.

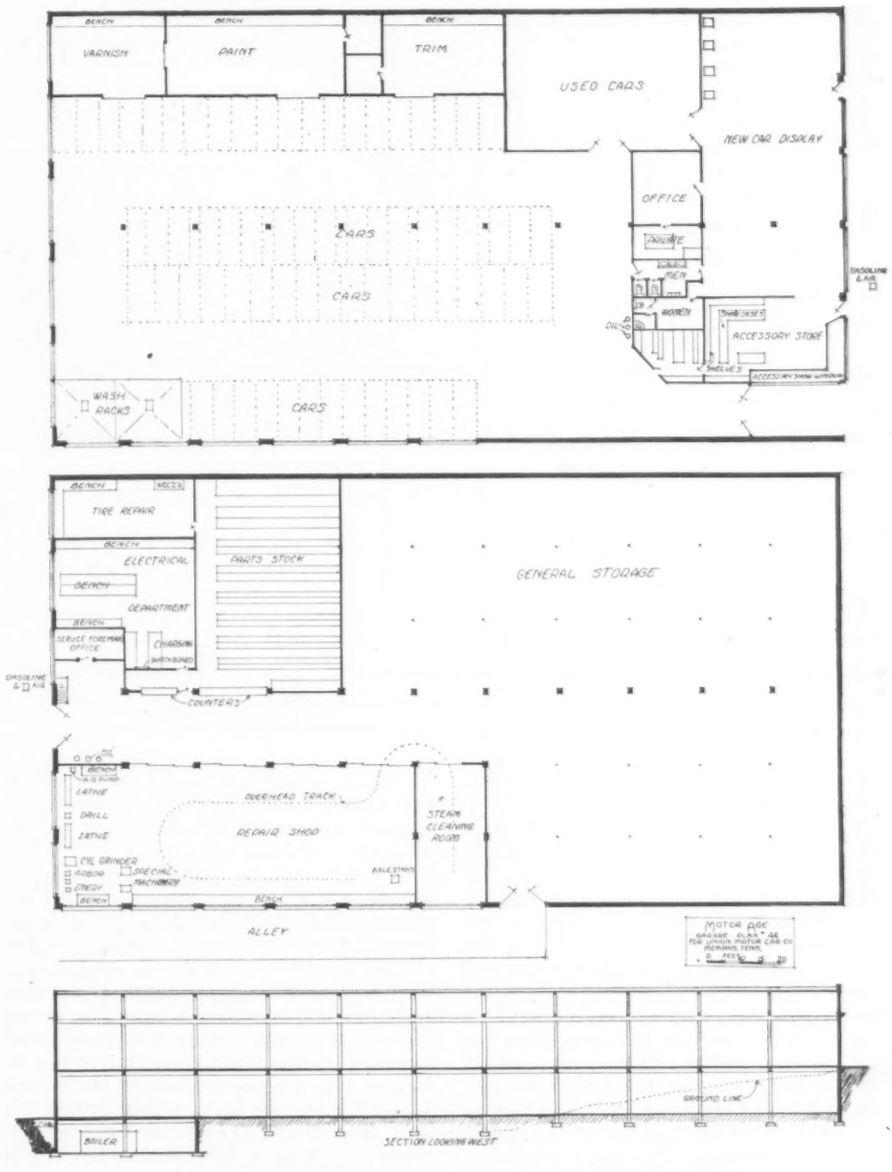
Where the driveway is one side, and all show space thrown in one room, it makes an excellent showroom, but incoming cars must make a turn to get into aisle after passing showroom, which forces parked cars on this side to be set back to allow for the turn, which wastes space. It seems to us the double driveway with showroom in center also is a waste of space, as only in very large garages would the two driveways be necessary.

Please give us your ideas for a garage with 50 ft. front and advise if it would be practical to construct one of 50 ft. width with a 12-ft. door in center, office or showroom on one side only, the other side not being enclosed and in condition for being used to display cars or for parking cars as part of regular storage room.

We have purchased a lot 50 by 167 ft. fronting on Main street, 50 ft. lying with an alley on one side, railroad tracks on other, with switch along building for unloading cars. This will give us a building open on all sides, as there is no building adjoining at back. The alley slopes sharply downward from Main street, which will give us entrance to basement all along the side. Would you advise setting back the building 17 ft. from Main street, leaving a space for parking or examination of cars before they are driven into building or for a gasoline filling station, etc., or would it be better to set building right on the street and cover this space?

We are considering building with basement covering the whole lot, one story level with the street, and getting a balcony in center above entrance, with probably a low-ceiling room on each side for a ladies' waiting room. The men's toilet could be downstairs in the basement, with entrance near office at front. We would like to know if we should use reinforced concrete construction for main floor and posts in center of basement, or steel posts with concrete and steel construction in floor. We would also like to have a discussion of the steel truss roof, the plain A-type, wood truss roof and the lattice wood truss roof.

We do not expect to have more than two cers on the sales floor, as we have another garage salesroom just across the alley in our present building. Our departments will include battery charging, about ten batteries at a time, and tube vulcanizing, about twenty-five tubes at a time. There will be four men in the repairshop. We will want showcases for the accessories, tires and the stock of Ford parts carried, separate office from the showroom.—Dudley Garage, Flemingsburg, Ky.



Floor plans for large Memphis garage, measuring 120 by 220 ft.

Everything is in favor of the side driveway as against the center. It is true the center driveway allows a more symmetrical layout of the building front and that it may also cause less waste of space inside, but if the interior is utilized properly the amount of space wasted should be nearly negligible, and if a competent architect is employed he should be able to produce just as attractive a building with a side entrance as with a center entrance.

The advantages of the side entrance are that it allows an unbroken display window space, which is a distinct advantage. Also it reduces the effort of customers and help alike. Showrooms, accessory store and offices are all in a compact unit, and thus time and effort are conserved. A better layout can be obtained with this single unit. To split the front of the building, would result usually in wasting perhaps as much space in the layout of showroom, store and offices as might be saved in the garage. For these reasons, briefly stated, we strongly advise you to adopt the side entrance and have drawn your garage plan accordingly.

The space you suggest leaving at the front would detract from the value of your display windows. Therefore, it is suggested you place the front of your building on the sidewalk line, using curb pumps for gasoline service and leaving a space at the rear of the building.

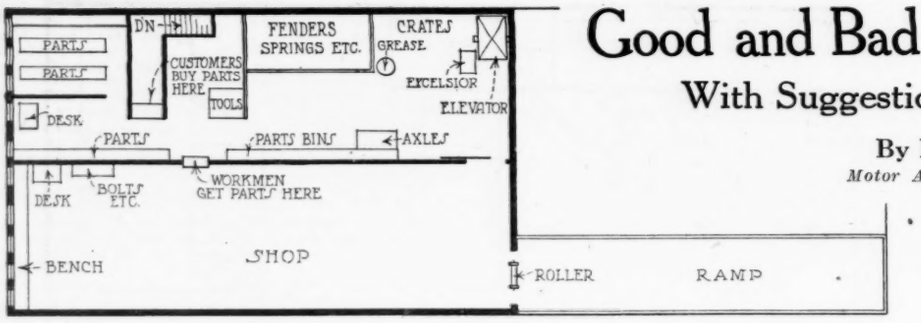
Whether you use posts or not in the basement or whether you use a steel or reinforced concrete construction is too large a subject to discuss here. Mainly it is a compromise between expense, time of construction and convenience. To build a floor without posts is more expensive than to build one with posts. Also you probably will have to wait longer for delivery of fabricated steel than you would for materials required for reinforced concrete construction.

A steel truss is somewhat more fireproof than a wood truss, the word somewhat being used because even a steel roof will collapse under heat.

Good and Bad in Southern Service

With Suggestions for Improvement

By B. M. Ikert
Motor Age Editorial Staff



Typical layout of what is found in a good many service stations in the South, where better buildings are coming slowly

THE photographs and ground plans shown herewith are typical illustrations of what is to be found in a good many of the service stations in the Southeast. To look at the exterior of this building you would expect to find a pretty well rounded out and efficient layout in the interior, but too often this is not the case. It is not true only of the South but in all parts of the country, but you will find it to a far greater extent in the South, because this part of the country is in a transition period. Better service stations are coming, but slowly. In a good many instances the owners realize their establishments are too small and are making plans to enlarge or put up new places.

It is wrong to assume the Southern dealers, though handicapped by inferior service stations, are not making money. They are selling cars as fast as they can get them, and service is rendered fairly satisfactorily. The point we wish to make is that they could increase the volume of their business still more and carry on A-1 service by a little re-arrangement very often, or resourcefulness. Sometimes a few dollars' worth of paint would help to make the places more attractive; the accessory stock could be re-arranged; better light secured in the repairshop; the floors scrubbed; pictures hung straight in the offices and other such things.

Floors of Cement

When you go into this place you strike first the showroom, where at least some attempt has been made for attractiveness in the flower boxes at the windows. Instead of the tiled floor you imagined you find a floor of cement, a little rough at that. The interior finish consists of beaded ceiling material painted white. This material is characteristic of many of the offices and showrooms of the Southern service stations. On the main floor is also the sales manager's desk and the stairway leading to the balcony. The latter is a typical layout to be found in the Southern stations, generally having two or three offices partitioned off and a desk or two strewn about the balcony.

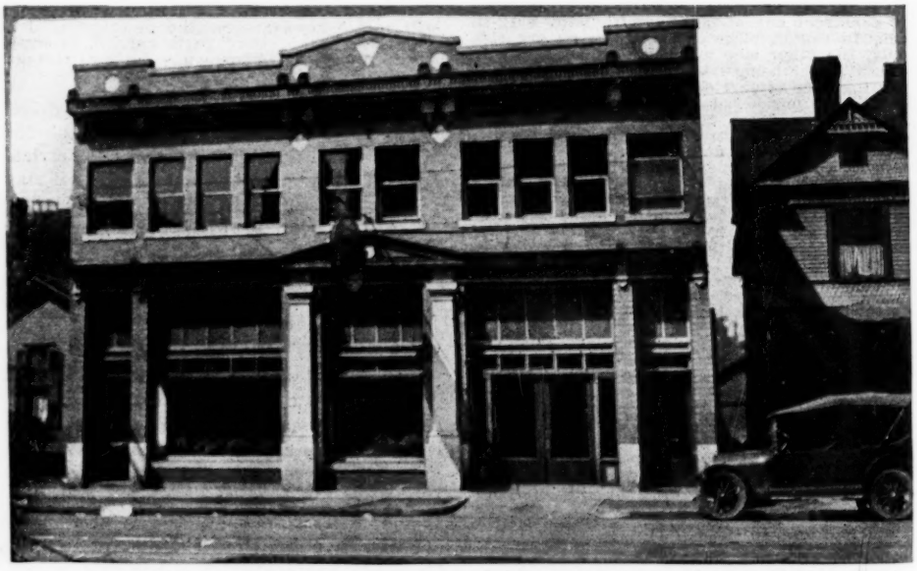
The main floor is divided about squarely in two, by a partition running across the building, with a sliding door at the right. This door is in line with the main entrance for cars, which to get to the second floor have to pass through the building, out into the alley and run up the ramp, as shown by the dotted line. There is only one small elevator in the corner, but this is not in use, as supplies are carried to the second floor by a service truck which carries the stuff from the freight depot right up the ramp. Or with a very large shipment a heavy truck carries the freight to the alley, and here the service truck backs up to it and conveys the goods the rest of the distance. A roller is embedded in the top of the ramp for a cable or rope to slide on when towing up a car.

The light in the repairshop is poor, coming only from the windows in front and the open door at the rear. A partition extends the entire length of the second floor and cuts off a great deal of light. There is not a well-defined system of placing the cars when they are in the shop, and engine work, axle work and other operations, instead of being segregated, are performed apparently in the most convenient spot at that time. A progressive system of repair is necessary in most of the Southern service stations. By this method cars are parked in a certain place while the engine, or whatever is to be repaired, is sent progressively from one department to another with the least amount of handling. One man takes care of the gearset, another the bearings and so on. There is a vast opportunity for makers of engine stands and other labor-saving devices for the repairshop to spread their products on a large scale throughout the South.

Service Manager's Desk

One of the illustrations shows the poor arrangement of the service manager's desk and the adjoining bins containing bolts, nuts, etc. The latter should be in with the parts department, even though they contain the parts needed more often than others. It is never a good plan to have a department scattered all over the place.

This place carries quite an elaborate parts department and has some good features incorporated in it. The bins are painted black with white stenciled figures, easy to read. It makes a better job than where the bins are not painted and have a black letter painted on them. Each bin has a card tacked on the inside, giving the



This service station, snapped in Birmingham, Ala., looks from the outside as if a rather efficient layout within were followed, but too often it is not

part number, name and models it is used on. By putting the tag on the inside there is no danger of its being torn off. The tags are tacked on the left side of the bin, as the light comes from the right, and they thus are easily read. To avoid large numbers on the bins, the cases are marked A, B, C and so on. The bins of these cases then are lettered 1, 2, 3 and so on. The manager of the parts department has on his desk a file containing cards giving the factory number of the part, description, bin location and other features. If this card says the part is in G-43, he knows exactly to what case and bin to go. These cards are printed on both sides and when one side is full it need only be turned over and will thus serve for quite a stretch of time.

Poor arrangement of service manager's desk and adjoining bins for bolts, etc.

Suggestion for Dealers

One of the objections, although not serious, is a customer has to go first to the balcony and then up another stairs to buy parts. A plan that might well be followed by the Southern dealers is that where the parts department is located on the ground floor, have a dumb waiter running to the shop above. Or the parts department can be placed on the second floor with just enough stock kept on the main floor to take care of articles called for most, while the waiter makes quick work of sending down any other parts wanted.

In the rear of the building opposite the ramp is a sheltered spot used for washing cars and storing such other cars which are just this side of the junk pile. The storeroom in the rear of the main floor is very dark and about the only use to which it can be put is to store cars. By installing plenty of windows on both sides, it would be possible to locate the offices here, as well as the parts department, in addition to having a space for quick service. This would give the second floor for a repair-shop, with a bench running across the whole front and cars parked on both sides, leaving the middle free for cars to get in and out. We believe also, under these conditions, it would be an advantage to put in an elevator in the corner of the structure in line with the entrance and in the quick-service room. Thus if a car had to go to the shop it would only be necessary to run on the elevator and be carried to the floor above. If not necessary to go to the shop, the car could be driven out the rear and into the alley.

Part No. 346

Name CLUTCH SPRING

MODELS USED ON

Form S. D. 8 83 - 90

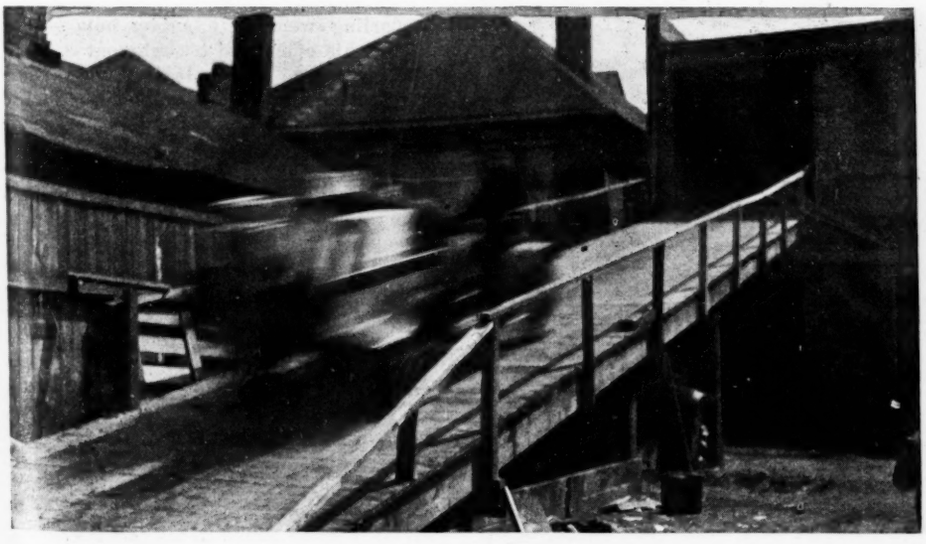
PART NO.	DESCRIPTION	PRICE	BIN NO.	MINIMUM
346	CLUTCH SPRING	.85	G-12	

DATE	ORDER No.	AMOUNT	DATE	REFERENCE No.	REC'D	DEL'D	BALANCE	DATE	REFERENCE No.	REC'D	DEL'D	BALANCE

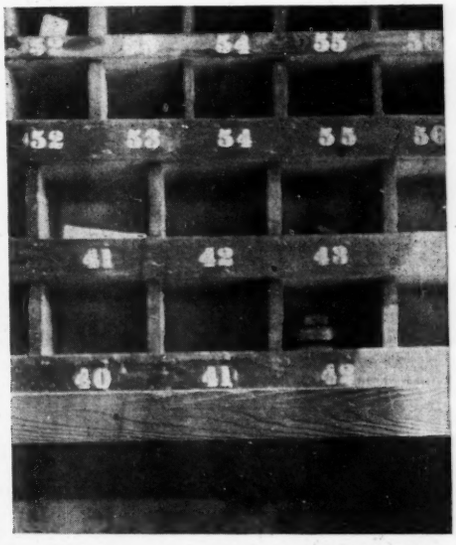
These two forms are part of the elaborate parts department. Each bin has a card outside with part number, name and models. The manager has a file with with cards of the data above

Grease Unprotected

As in many of the other service stations visited, grease was kept in an open barrel, with no protection from dirt or other foreign matter. It would require but a few hours to build a neat wooden box with hinged lid for the grease and oil barrels, or there are to be had metal retainers for lubricants fitted with dust-tight lids. One thing noted in this place was a neat metal box to hold excelsior. This is messy stuff and gets all over the shipping room if not contained properly.



To use this ramp one must follow the dotted line shown in the floor plan on opposite page



The bins in the parts department are black with white letters

Growth of Repairshop in Northwest Slow but Sure

From Small Beginnings Men of Vision Develop Automotive Service Stations

By Fred M. Loomis
Motor Age Editorial Staff

LABORIOUSLY and slowly, but nevertheless surely, there is growing up in the Northwest a business in the automotive industry that is demanding recognition. This is the automotive repairshop, exemplified by such shops as that conducted by Arthur Sparling at Langdon, N. D., and that of C. O. Russell at Devil's Lake, N. D. These shops are predominantly automotive repairshops. Some, like Sparling's, sell motor cars but make that subsidiary to repair. Others, like Russell's, are exclusively repair.

From Small Beginnings

These shops are developing laboriously. The term is used advisedly. They are evolving and asserting their place in the industry, and for the most part they are developing from very small beginnings, started by men who had little or nothing except their mechanical skill and the vision to see an opportunity. Most of these men had little or no capital. What they may have now they have accumulated by dint of hard work and saving. That some of them are now well on the road to affluence speaks volumes for their courage and business ability, for the Northwest is a new country and these shops saw their beginnings placed among obstacles which easily might have daunted less courageous and hopeful men.

Take Sparling, of Langdon, for instance. From a farm implement experience which began in his boyhood days in South Dakota and which was continued for several years in southern Minnesota, he came to Langdon in 1906. The years spent by him in the implement business won nothing but profit for somebody else, and except for a training in salesmanship and business management, with an incidental mastery of the tinner's trade, acquired by self study, supplemented by a few lessons which a friend gave him at odd times, Sparling himself profited not a cent by the years of apprenticeship spent in the selling of farm machinery. He came to Langdon to take charge of the threshing machine department of a retail implement dealer.

For three years he worked for this man on a salary which nowadays would appear to be very small upon which to support a family. But during those years Sparling was doing something else besides earning his salary. He was falling in love with the country and acquiring a faith in its future which still abides unimpared. As the years have passed he has but accentuated his belief in the future of his neighborhood and to-day, successful in business, he is one of the most loyal and enthusiastic of boosters for North Dakota. Also, during the three years of selling threshing machinery he visioned a coming need and the possibility of meeting it. This was the necessity for service to the purchasers of automotive equipment and the means whereby this necessity best could be met.

Langdon to-day has only some 1400 inhabitants, and in 1909, when Sparling threw up his job with the implement man and began following his vision, it had even fewer. But it is the county seat of Cavalier County and draws trade from clear across the international boundary into the British possessions and from far south of the southern line of the county. Sparling saw in the development of this section an opportunity to employ his skill as a mechanic. He saw the coming of the motorized age, although at that time there were hardly more than a round dozen of motor cars in all Cavalier. Maybe it was his wife who showed the greater courage, for it was she who encouraged him to relinquish a sure salary for the uncertainties of the repair business. Then and since she has been a full partner with him in the business, and to her ability, encouragement and asistance, Sparling attributes the major portion of the success he has won.

Anyway, in the fall of 1909 he rented an old basement, paying the munificent sum of $3 a month rent. He made a bench, got a few tools together and began repairing gasoline engines and doing such odd jobs as happened to be needed on the few cars owned in that vicinity.

Sparling Business Grew

Business grew and at the end of six months he felt able to pay more rent for better quarters, so he rented an old blacksmith shop, for which he obligated himself for $5 a month. He remained here a year and made still another upward move, for he rented an old livery barn and began paying a rent of $15 a month.

Sparling went to a cubby hole in the wall of his office and brought out a little, old, dog-eared, pocket ledger, which contained the record of all the business he did during that first year. On the back page it was footed up. It amounted to $2,055.

From the office safe he took the ledger which contains the record of his business during the last year and showed the comparison. During 1918 he did a business of $67,900. Of this amount over $50,000 was for automotive repair jobs, and the balance represented sales of Overland cars. For since 1909 those twelve cars have increased until there is hardly a farmer in all that section who does not own at least one and, in addition, there are hundreds of tractors which need attention.

Sparling's business soon outgrew the livery barn. Then for $750 he bought the site on which his present building stands, and year by year he added to his facilities until now he has an office about 20 by 20 ft., a showroom about the same size, a shop about

Equipment in the automotive repairshop of Arthur Sparling, Langdon, N. D.

40 by 60 ft. and an addition which houses a storage battery service station.

The shop has all the mechanical equipment necessary to take care of the automotive repair work he is called upon to do. As respects cars, this naturally is confined largely to Overlands, since he is the local agent.

The way he worked into the selling of cars is interesting. As the demand developed in that section the friends he had made through his repair work naturally came to him for advice when they got to the point where they began thinking about owning a car. One by one he used to take them to Minneapolis, where a car would be picked out. The first year he sold six cars in this way, all of them used cars but one, getting a commission on the sales. Then he was offered an agency and gradually built up a business selling cars. But even so, his repair business always has been nearest to his heart and it remains so, the ratio between it and his motor car business being about 3 to 1.

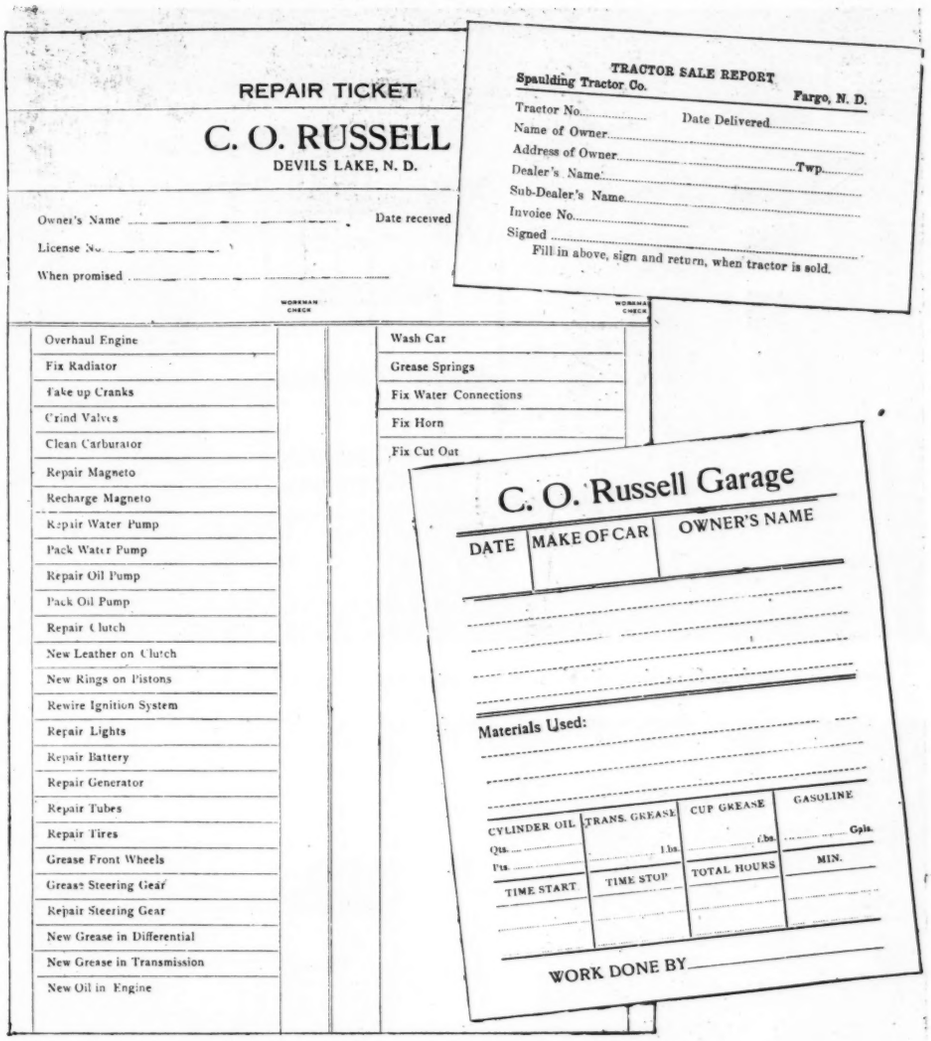
Builds on Good Work

Sparling has built up his business by doing good work and by always being on the job. As an instance of the latter: A fall or two ago, during threshing season, when an hour's delay means a heavy loss to the farmer, a customer of his called him on the 'phone late one afternoon and asked him if he could fix a magneto which had refused to work longer, provided the farmer would bring it right into the shop. The farmer said he had a threshing crew on his hands and unless he could have his tractor working again by the morning he stood in hand to lose some money. Although it was already quitting time Mr. Sparling unhesitatingly answered, "Yes."

The farmer arrived during the evening with the disabled magneto. In Langdon the municipal lights are turned off early. So. Mr. Sparling worked on that magneto by candle light until 5 o'clock in the morning and sent his farmer friend on his way rejoicing and eager to rout his crew out of bed for a day's work.

That's the sort of thing that has put Sparling over. He believes, too, in training his own men and then keeping them. He treats his men as if they were members of his own family. To him they are his boys. In a sense they are, too. He took them as boys and trained them himself, and such of them as happen to have no home of their own to go to sleep in a dormitory which he maintains over his shop. Roy Wells, who looks after the battery service station, has been with Sparling seven years, except for some months spent in England during the war as an aviator. W. J. Cooley, shop foreman, has been with him almost as long.

The advantage of this personal relationship in this particular section of the country will be appreciated by considering a fact peculiar to that section. During the summer time practically all the small town garages are closed, while the mechanics are working on the farms in threshing crews. The men make from $10 to $15 a day doing this work, more than they could make keeping their shops open. The Sparling shop stays open all the time, and his men stay with him.



REPAIR TICKET

C. O. RUSSELL
DEVILS LAKE, N. D.

Owner's Name ..... Date received .....
License No. .....
When promised .....

WORKMAN CHECK		WORKMAN CHECK	
	Overhaul Engine		Wash Car
	Fix Radiator		Grease Springs
	Take up Cranks		Fix Water Connections
	Grind Valves		Fix Horn
	Clean Carburator		Fix Cut Out
	Repair Magneto		
	Recharge Magneto		
	Repair Water Pump		
	Pack Water Pump		
	Repair Oil Pump		
	Pack Oil Pump		
	Repair Clutch		
	New Leather on Clutch		
	New Rings on Pistons		
	Rewire Ignition System		
	Repair Lights		
	Repair Battery		
	Repair Generator		
	Repair Tubes		
	Repair Tires		
	Grease Front Wheels		
	Grease Steering Gear		
	Repair Steering Gear		
	New Grease in Differential		
	New Grease in Transmission		
	New Oil in Engine		

TRACTOR SALE REPORT
Spaulding Tractor Co. Fargo, N. D.

Tractor No. ..... Date Delivered .....
Name of Owner .....
Address of Owner ..... Twp. .....
Dealer's Name .....
Sub-Dealer's Name .....
Invoice No. .....
Signed .....
Fill in above, sign and return, when tractor is sold.

C. O. Russell Garage

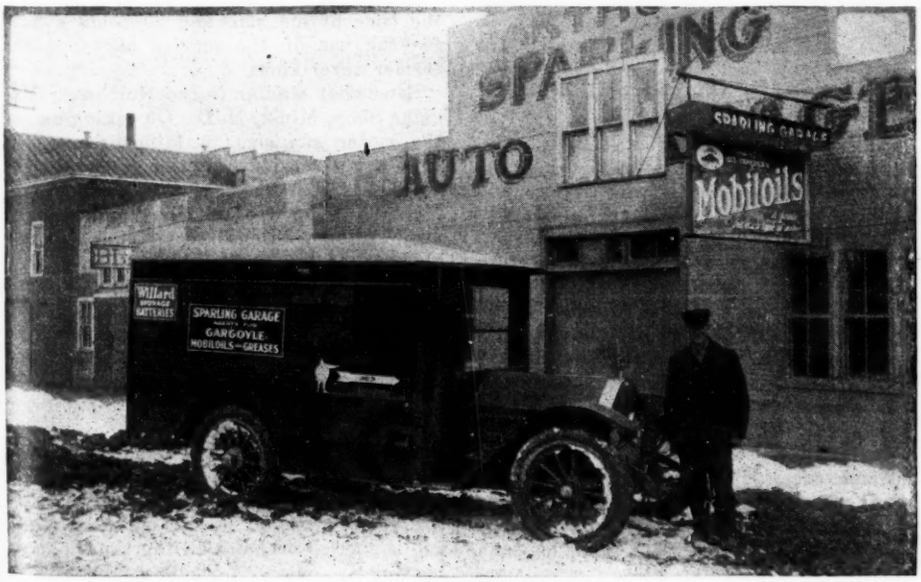
DATE	MAKE OF CAR	OWNER'S NAME

Materials Used:

CYLINDER OIL	TRANS. GREASE	CUP GREASE	GASOLINE
Qts.	Lbs.	Lbs.	Gals.
Pts.			
TIME START	TIME STOP	TOTAL HOURS	MIN.

WORK DONE BY .....

Two of these tickets are used by C. O. Russell, Devil's Lake, N. D. When the job comes in Russell and the owner check off the things to be done on the repair ticket. Charges for shop work are based on the second size. The smallest is another story. Dealers would not report where they had sold tractors, so the Spaulding Tractor Co., Fargo, N. D., sends each dealer as many cards as he has tractors, charging him $1 for each card and crediting an equal amount when the card is returned with the desired information



Lizzie, the portable repairshop Arthur Sparling will use for tractor service

How Arthur Sparling displays his repair and oil stock, Langdon, N. D.

Arthur Sparling, automotive repairman of Langdon, N. D., and part of his accessory stock

In line with his idea that service to be satisfactory must be prompt, Sparling carries an unusually well selected stock of repair parts. This normally will inventory about $3,000. In addition he carries a tire stock of about $5,000 and an accessory stock which will amount to between $3,000 and $4,000. He operates a service car and just is building "Lizzie."

Lizzie is, or will be, a peregrinating repairshop. A special body has been built on a Thomas six chassis, and when Lizzie goes out on the job she will have in her insides everything necessary to render first aid to a disabled tractor, for Lizzie will be used principally for tractor service. In compartments underneath the body, accessible from the outside, will be carried jacks, chains, towing ropes and such paraphernalia. Inside will be a complete assortment of tools and on the back end of the platform will be places where vises and the like can be put. In short, Lizzie will be a complete repairshop on wheels.

Along almost parallel lines runs the story of C. O. Russell, of Devil's Lake. Russell started in as an exclusive automotive repair man in March, 1914. He had met reverses in business—in fact, he himself says he was "busted"—but he was a good mechanic and felt sure there was somewhere a place he could fit in.

To-day, five years later, he has a prosperous and successful business. To be sure, he has as yet something of a shack in which to do business, it being merely an old livery barn, but the chances are that he soon will have provided for himself a well appointed and built garage. He says his business is storage, accessory and repair, with the emphasis on repair. He works three men all through the winter season and from six to eight in the summer, because he too looks after tractor service.

His shop has modern equipment as welding table, reboring machine, lathes, drills, gear press, grinding machines and a full complement of small equipment. His tools are notable for many labor and time saving adaptations which he has made himself.

During threshing season Russell has more work than his force can take care of. The men whom the farmers are compelled to hire are, most of them, incompetent or indifferent and they cause many troubles with the machinery which Russell is called upon to cure. It seems that the farmers can get little or no quick service out of the men, usually implement men, from whom they have bought their equipment, such as engines and threshers, and quick service is necessary, hence Russell.

A threshing crew costs the farmer all the way from $140 to $250 a day in wages, according to its size, so, when a tractor breaks down the farmer hardly can afford to let his crew lie idle while the implement dealer is wiring to the nearest jobbing center for an expert to come and fix the machine. Somebody has to get there on the jump and Russell does it.

Emergency Service

Some of the service jobs sound silly, but they illustrate just how remiss is the implement man in instructing his customer and how far he falls short in rendering emergency service. A farmer 16 miles out in the country 'phoned in to Russell late one afternoon that something had gone wrong with his machine and that he must have a man out there at once. The man got there long after dark. Nevertheless, he went to work and found upon investigation that all he had to do to make the tractor work was to narrow the gap between the points on the spark plugs. This took only a few minutes for a man, who knew what to do, yet a $200 thresher crew had been idle for three-quarters of a day. Another 20-mile ride was taken by one of Russell's men to pull a little plug of waste out of a gasoline feed pipe.

Incidentally he charges $1.25 an hour for the time of his man and 20 cents a mile for the use of the service car—and the farmer never kicks.

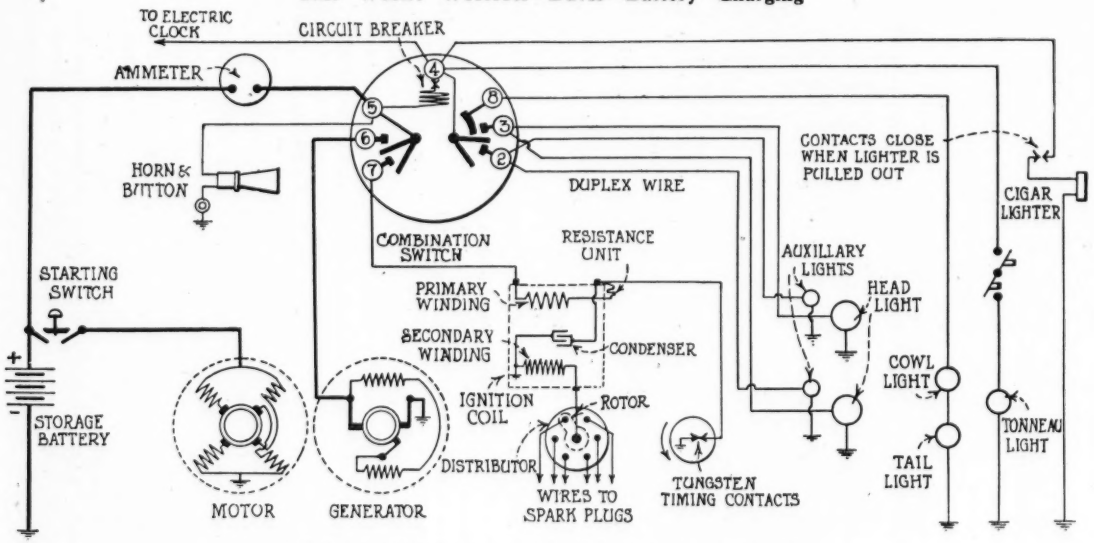
Somewhat similar is the Northwest Machine Shop, Minot, N. D. On asking one of the motor car men in Minot where the farmer got service when he needed it, the reply was that he went to the Northwest Machine Shop for anything outside the very ordinary things the motor car or implement dealer could do for him.

The Northwest Machine Shop has done work on motor cars in the past but will devote its activities almost exclusively to tractor service in the future. The shop equipment includes lathes, presses, drills, reboring machine, grinders, welding equipment and the like.

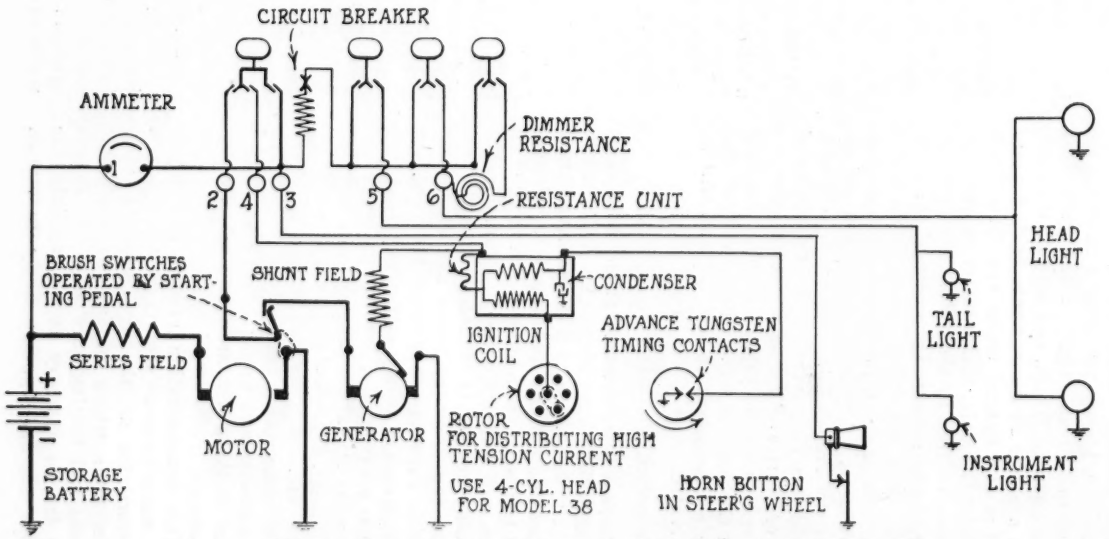
During the last year the shop made and fitted 187 driveshafts and axles in motor cars, for instance, and made twelve axles for tractors. Cored babbitt metal in lots of 500 is carried on hand all the time to meet bearing troubles. A small stock of oversize pistons is carried to meet emergency demands.

Motor Age Wiring Diagram Chart No. 27

This Week: Westcott—Davis—Battery Charging

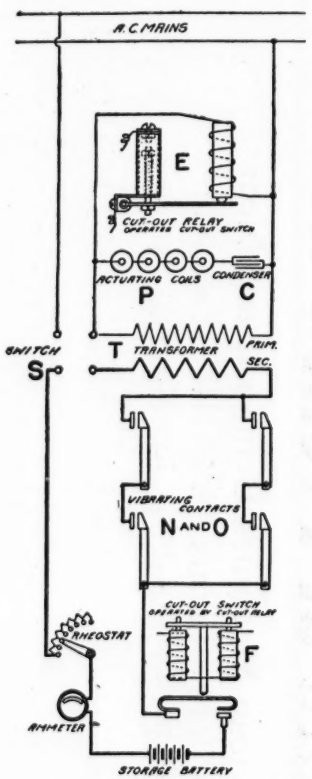


Delco system used on the Westcott in series 17

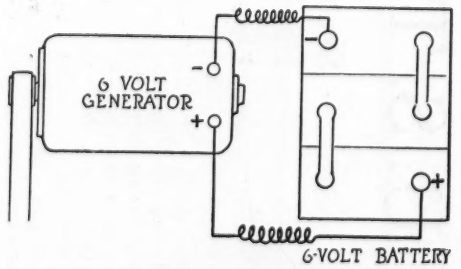


Delco system used on 1916 Davis C-38, 6-2 and 6-G

Abbott—March 20-27
Alco—April 24
Alter—Nov. 14
Apperson—March 6
Buick—Nov. 21-April 3
Cadillac—Dec. 9
Cole—Jan. 23-April 3
Cartercar—May 1
Case—Feb. 27
Chalmers—Feb. 20
Chandler—April 3
Chevrolet—Nov. 28-March 27
Detroiter—March 6
Dodge—Dec. 12
Dort—March 13
Elgin—Feb. 27
Empire—March 13
Ford—Jan. 30
Grant—Feb. 27-March 27
Henderson—April 3
Hudson—Dec. 5-May 1
Hupmobile—Feb. 13
Interstate—March 13
Krit—Feb. 6
Lexington—April 24
Little—March 20
Locomobile—Jan.23-April 17
Marion—March 6-20
Maxwell—Jan. 16
Mercer—Jan. 23
Michigan—March 20
Mitchell—Jan. 9
Murray—May 1
Oakland—Jan. 2
Oldsmobile—Jan. 23
Overland—Nov. 7-14
Premier—April 10
Pullman—April 10
Regal—Feb. 6-April 10
Reo—Feb. 27
Saxon—April 17
Simplex—April 17
Scripps-Booth—Dec. 26
Stearns—April 24
Studebaker—Dec. 26
Velie—April 24



Connections in Edison alternating-current rectifier



Charging 6-volt battery from 6-volt generator driven by belt from gasoline engine

U. S. Tractors at French Exhibit

Sixteen American Machines Demonstrated Near Paris—Thirty-four Firms Are Represented—Details of Foreign Makes in Spring Event

By W. F. Bradley

PARIS, April 5—By mail—Sixteen American tractors are demonstrated in the big spring farm tractor exhibition this week on a farm at Saint-Germain, 12 miles west of Paris. Thirty-four firms are present, some of them with two or three models of the same type. Seventeen of these firms are French, one is English, and the rest are American.

American Tractors Renamed

The American tractors are difficult to recognize on their catalog descriptions, for in most cases the French importers have re-christened them since taking them over. Frequently what at first sight would appear to be a French production turns out on a closer examination to be a well-known American tractor. The leading American makes represented are Fordson, Moline, Cleveland, Titan, Parrett, Case, Avery, Rock Island, Happy Farmer, Gray, Never Slip and Monarch.

This meeting is not of a competitive nature. A big stretch of land has been secured to left and right of the main road from Paris to Havre, and on this the tractors are free to demonstrate from 9 a. m. to 6 p. m. Special trains run from Paris to Saint-Germain, and a motor bus service carries visitors to the field. Business appears to be satisfactory, most of the sales being made not to individual farmers but to groups or co-operations of not less than seven men. Any such group can obtain from the French Ministry of Agriculture a subsidy varying from 30 to 50 per cent of the cost price of the machine. Purchasers under this system have to give a guarantee that the machine will be kept in repair and that a determined amount of land will be cultivated.

Information Needed

Before this demonstration had been brought to a close it was realized that it ought to have been of a competitive nature to provide definite and practical information to possible purchasers. Information on price and delivery dates is obtainable but on all other points connected with the machine vague, contradictory and frequently foolish answers are given. Many of the makers cannot answer elementary questions on gas consumption, drawbar pull, speed of operation on various land and under varied conditions, depreciation, possible cost of repairs, etc. A practical test would have given some sound basis on which to make comparisons and would have been of great value to those who are contemplating purchase.

This demonstration reveals that motor car manufacturers are very active in farm tractors, for all the new machines come from firms which before the war built trucks and touring cars only. In France the tractor industry is getting into the hands of, and appears likely to remain with, the motor car industry. The three most important new arivals are Renault, Delahaye and Gnome & Rhone. Other big firms are De Dion Bouton, Latil, Schneider, Peugeot, and the Paris General Omnibus Co. The Gnome & Rhone Co. is the well known aviation engine firm, which possesses in the suburbs of Paris a couple of the most modern factories to be found in Europe.

There is no uniformity in the minds of European manufacturers regarding the best type of farm tractor. They are all using four-cylinder, vertical truck-type engines, and they are all putting as good work in their tractors as in the best trucks, but beyond this the greatest diversity exists.

Fiat, who is representative of Italy, and Austin, who is representative of England, have adopted the four-wheel frameless type.

Renault, the biggest motor car manufacturer in France, has adopted the self-track-laying type.

Delahaye, one of the biggest truck makers in France, has built a self-contained plowing machine, with plows placed in front and in rear.

Latil, the most important four-wheel-drive tractor made, has a self-contained machine with plow in the rear.

De Dion-Bouton has adopted the cable system of plowing with fixed tractors.

The big Schneider company has both an endless-track type and a rotary plow.

The Paris General Omnibus Co. has adopted the English Saunderson type of direct-towing tractor.

Filtz has a special type of cable machine, the ends of the cable being fixed and the machine hauling itself along by winding drums.

In the cable class alone there are three distinct methods, and both gasoline and electricity are employed as the motive power. In the first class is the De Dion-Bouton type, where the two machines take up a position at the extremities of the field and haul the plow across the land by means of a cable and winding drums.

In the Doisy system the tractor runs across the field, unwinding its cable as it goes, then anchors itself and hauls the plow by its winding drum.

Filtz Cable System

Finally the Filtz type has the ends of the cable fixed at each extremity of the ground and hauls itself along by winding drums, with the plow in direct tow.

All the leading European makers, Fiat, Renault, Delahaye, De Dion Bouton, Latil, Schneider, use their truck engines with inclosed valves on one side, high-tension ignition, forced feed lubrication and automatic carbureters for gasoline or kerosene.

Air cleaners are not used by anybody, for the climate of France and England is so damp that a tractor aspires less dust than a truck on the road.

Nobody has made any provision for night plowing, for this does not appear to have entered into the habits of the French.

European Machines Costly

European machines are costly. The Delahaye is listed at $7,000, calculating at the nominal rate of 5 francs to the dollar. This price, of course, includes the plows, as the machine is self-contained. The Renault creeper type is sold for $5,700. The Fiat runs about this price, and the Latil is a little higher. Some of the cheapest direct tractors are selling at $2,400 to $3,500.

Since Nov. 11 Renault has transformed his army tank shops into a tractor-producing plant and is turning out 100 farm tractors a month. The asembly of these tractors is carried out in a very modern method on a moving rail. The Renault tractor is the direct outcome of his two-man war tank. The engine is exactly the same, being a four-cylinder block type of 95 by 160-mm. bore and stroke. The gasoline feed adopted on the tank to assure a flow of gas to the carbureter whatever the inclination of the machine has given place to direct flow by gravity. The special lubricating system, however, with dry base chamber, has been retained.

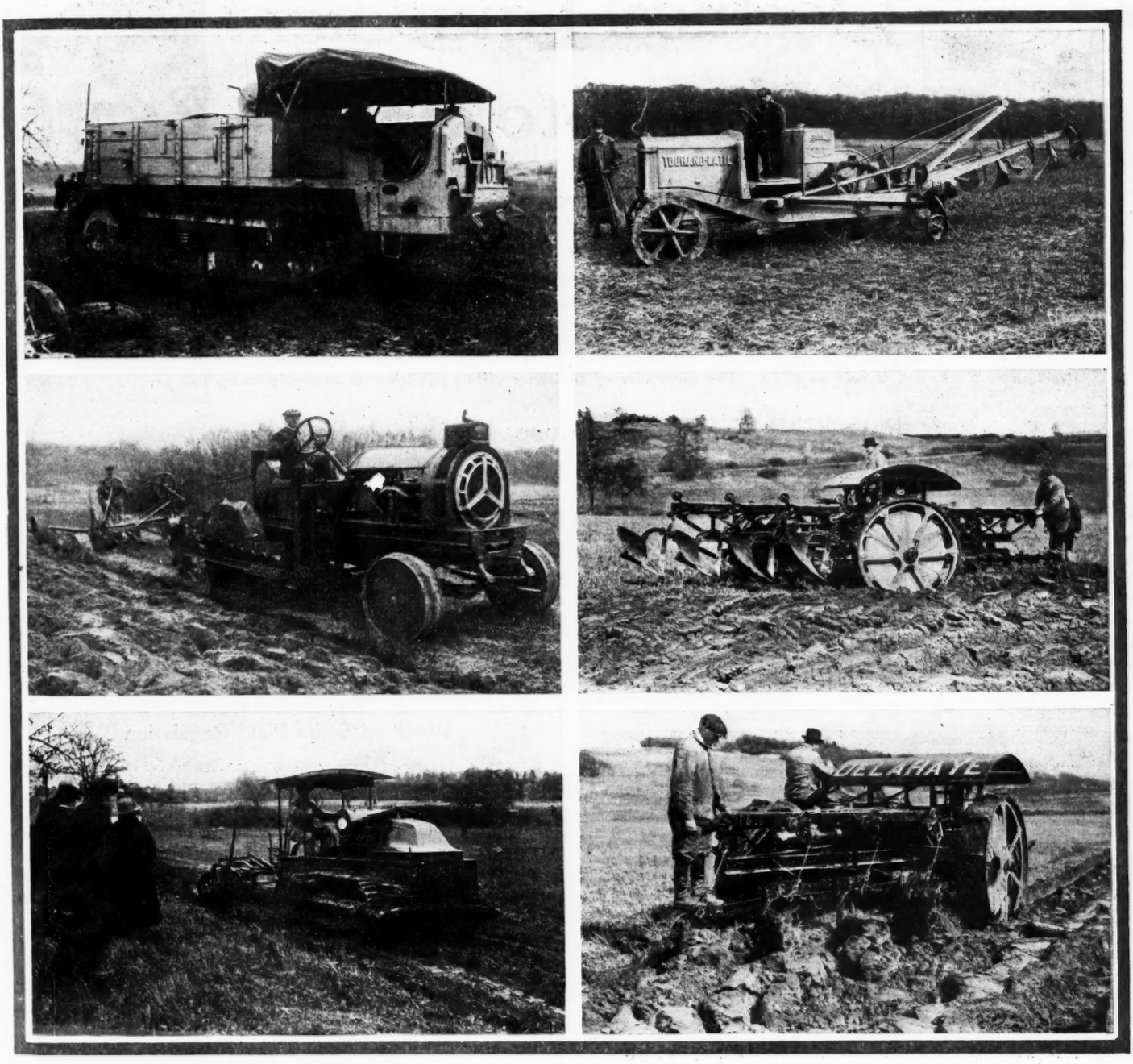
Instead of the engine being at the rear, as on the tank, it is mounted at the front, under a hood, with a radiator behind it, inclined at an angle of about 45 deg. This radiator is of the gilled tube type, with a ribbed aluminum header tank, and has a draft of air drawn through it by the flywheel fan. In this way no air is drawn in over the engine.

How Power Is Transmitted

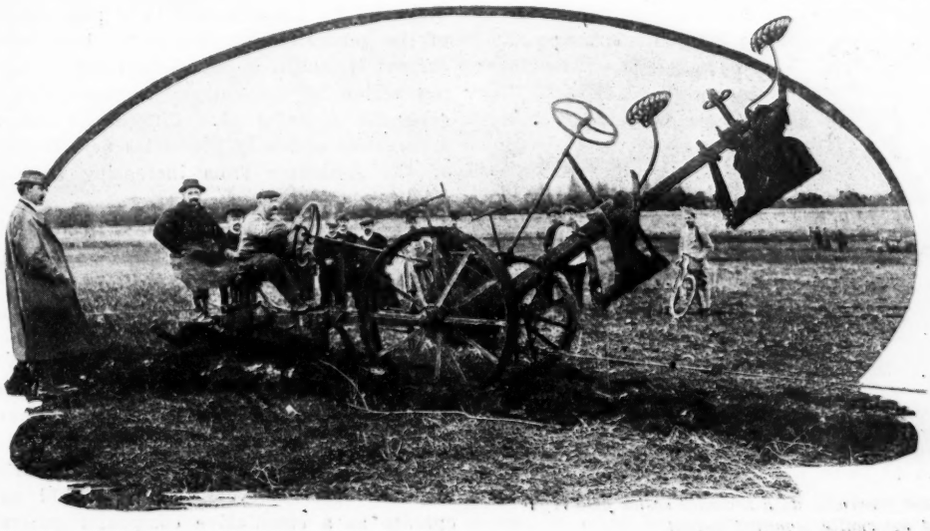
From the engine the power is transmitted through an inverted leather-faced cone clutch to a four-speed gearbox, then by two Ferodo-lined lateral clutches and a train of reducing gears to the two driving sprockets, one on each side, which transmit the movement to the endless bands. As in the case of the tank, the tension of the endless band is maintained automatically. Indeed, the whole of the track-laying mechanism is the same in general design as on the tank. Naturally the parts are smaller and lighter, the bands, for instance, having a face width of 7 in. compared with 13½ in. for the tank. Steering is by two levers mounted on a vertical column. By pulling the right lever the lateral clutch on that side is withdrawn and the entire tractor made to turn to the right. The powerplant is mounted in a channel section frame attached at the rear to the endless-track mechanism and secured at the front by an inverted semi-elliptic spring.

(Concluded next week)

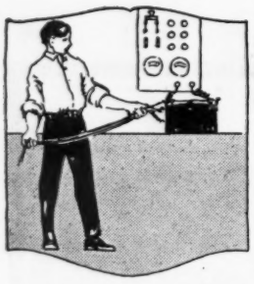
Some of the Tractors at French Exhibition



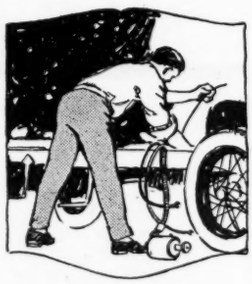
From top to bottom: Schneider, which is outcome of big French tanks; La Feire; Renault. The only French electric plowing system is at right



Here are three photographs of tractors with self-contained plows. From top to bottom they are: Tourand-Latil; Delahaye, which is in two views



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the 145th installment of a weekly series of articles begun in MOTOR AGE, *issue of June 29, 1916, designed to give the repairman and motorist the knowledge which will enable them to care for and repair any and all of the electrical features of the car, no matter what make or model it may be.*

The first half of this series has been published in book form by the U. P. C. Book Co., Inc., 243-249 West Thirty-ninth street, New York, and is sold at $2.50. The remainder of the series will be published as a supplementary volume.

Part CXLV—Westinghouse Electrical Systems

NUMEROUS different types of electrical equipment for the motor car manufactured by the Westinghouse Electric & Mfg. Co. are in use. In the majority of these installations the single-wire system is used, and the positive side of the system is grounded in practically all cases, if the system is grounded at all. In some systems the generator and motor actions are combined in a single machine, while in the majority of cases they are taken care of by separate machines. The systems in which the generator and motor actions are combined in a single machine are the 12-volt type, and in the majority of cases the two- and three-unit systems are of the 6-volt type. In some cases the ignition is combined with the generator, and in some it is taken care of separately.

The starting motors are all quite similar in their electrical operation, but quite a number of different methods are used in transmitting power from the motor to the crankshaft of the engine, and in this way there is quite a wide variation in their construction. Several different types of starting switches are used and they will be described briefly in one of the following sections. The lighting switch is usually of the push-button type. All the various circuits are fused by cartridge fuses mounted in fuse boxes or compartments provided for them.

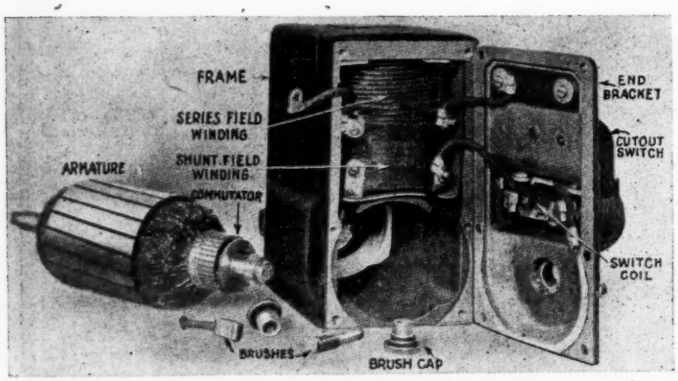


Fig. 704—Westinghouse generat or with reversed series field regulator and internally mounted cutout

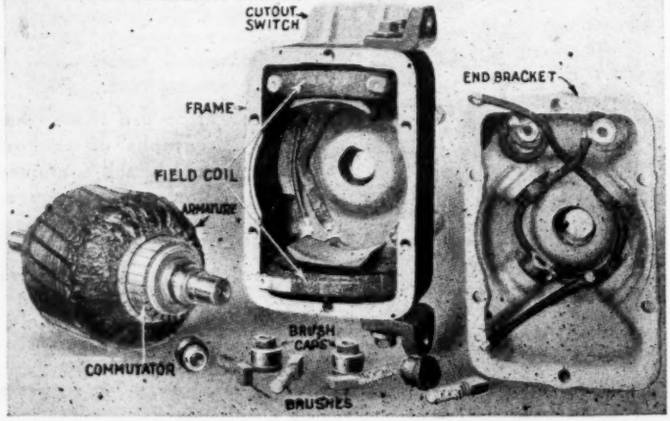


Fig. 705—Westinghouse generator with reversed series field regulator and internally mounted cutout

Reversed Series Field Regulation

Exploded views of two generators with reversed series field regulation are shown in Figs. 704 and 705. The automatic cutout is mounted inside of the frame of the generator shown in Fig. 704 and in the case of the generator shown in Fig. 705 the cutout is mounted outside the frame of the generator. The internal connections of the generator shown in Fig. 704 are given in the diagram in Fig. 706, and its operation, as well as the operation of the generator with an external cutout, is as follows:

As the speed of the generator builds up its voltage increases, and finally sufficient current is produced in the shunt winding of the cutout to produce ample pull on its armature to close the cutout contacts. When the cutout contacts close the generator immediately starts to deliver current, provided its voltage exceeds the voltage of the battery, which should always be the case when the cutout contacts close. If no lamps are turned on, the current delivered by the generator will pass through the series winding of the generator and charge the battery. The direction of this current is such that its magnetizing action opposes the magnetizing action of the current in the shunt field winding and the generator operates as a differential compound generator. This differential action of the series field tends to prevent the output of the generator from increasing as rapidly as it otherwise would do.

If some current is being supplied to the lamps and this current is less than the generator current, then the current in the series winding will be equal to the generator current minus the current taken by the lamps, and the demagnetizing action of the series field will not be as great as it was in the previous case, which results in the generator output increasing a little more rapidly. If the lamp current exceeds the generator current, the battery will have to assist the generator, and the current in the series field will be in the reverse direction to what it was in the preceding cases. The magnetizing action of the series field will assist the magnetizing action of the shunt field and the generator will operate as a cumulative compound generator. It is thus seen

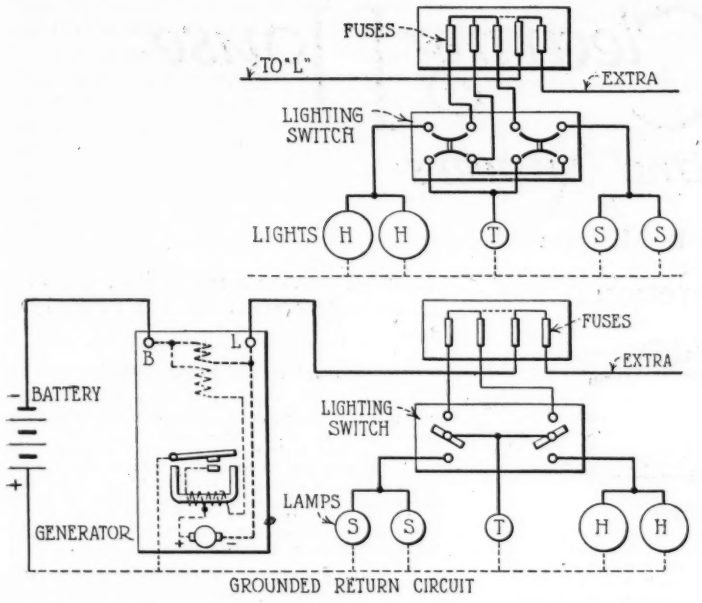


Fig. 706—Internal connections of Westinghouse generator shown in Fig. 704.

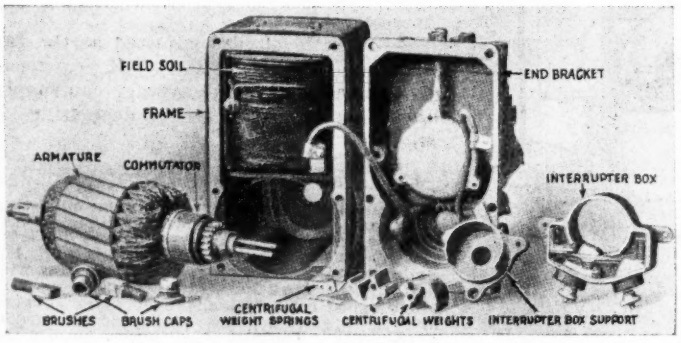


Fig. 707—Westinghouse ignitio n and lighting generator with reversed series field regulation

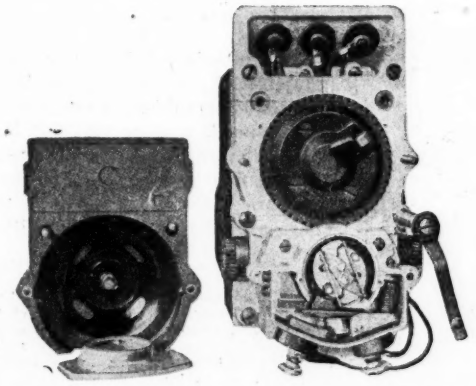


Fig. 708—Exploded view of ignition end of Westinghouse ignition and lighting generator

that as the lamp load increases the magnetizing action of the series field is changed, and this change of itself tends to cause the output of the generator to increase. An exploded view of the interior of another form of generator with reversed series field regulation is shown in Fig. 707.

In addition to performing the generator functions this machine has a distributer, an interrupter and ignition coil mounted in the end opposite the commutator and thus serves as an ignition unit. A view of the machine with the distributer and interrupter cover removed is shown in Fig. 708, and the position of the interrupter

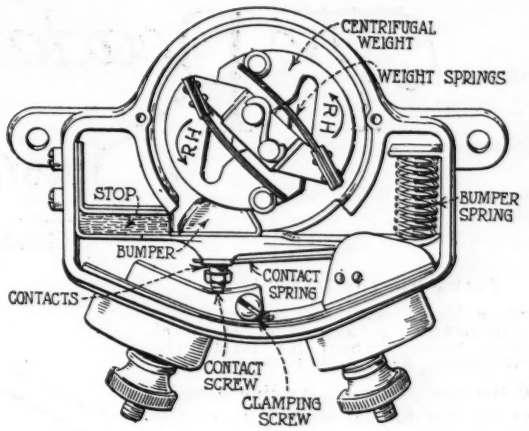


Fig. 709—High-speed position of interrupter weights on Westinghouse combined ignition and lighting generator

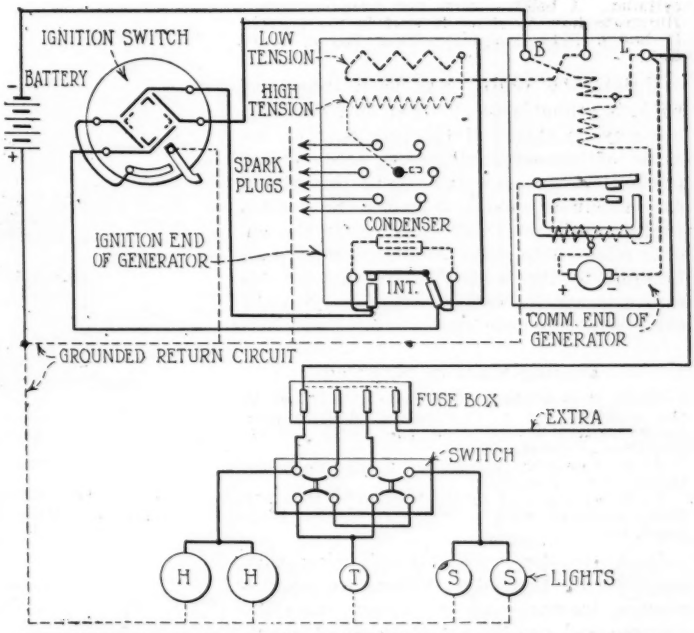


Fig. 710—Internal connections of Westinghouse combined ignition and lighting generator

weights at high speed is shown in Fig. 709. A diagram of the connections is shown in Fig. 710.

The operation of the ignition system, including the interrupter and distributer, ignition coil and switch, begins with the making of the primary circuit of the coil when the centrifugal weights push down the fiber bumper, allowing the interrupter contacts to close. Then the weight moves off the fiber bumper, allowing the contacts suddenly to separate or open, when a high voltage is induced in the secondary of the ignition coil and directed by the distributer to the proper spark plug, causing a spark at the spark plug gap. As the speed of the engine increases, the weights are thrown out from the center and automatically advance the time of closing or opening the interrupter contacts and, hence, advance the spark. At the same time, due to their shape, they keep the contacts closed during a greater part of the revolution when running at high speed; this makes the period of contact practically the same at all speeds and prevents the spark voltage from falling off at high speeds.

In generators not provided with automatic spark advance the centrifugal weights are omitted and a cam substituted. The interrupter contacts are changed so as to make the breaking of the contact occur when the lever is pushed down by the cam instead of when being returned by the spring.

The Readers' Clearing House

Questions and Answers

Conducted by B. M. Ikert

Carburetor and Manifold

Q—Could a Marvel carbureter be used with a hot pin manifold on a Ford, or would this make work better without the manifold?—George W. Baadte, Andover, S. D.

With the low grade of gasoline now being sold any device that will aid in volatilizing the fuel will be of benefit and will make for economy. This should give good results.

Indian Starts Hard

Q—I have a twin Indian motorcycle that is hard to start. It seems to hit only on one cylinder. I believe it is not properly timed. Illustrate how to time, if that is the trouble. It has a Dixie magneto.—Tom Payne, Hays, Kan.

Unless the timing has been interfered with, it probably is all right, but the trouble may be this: Motorcycle engines, because of excessive vibration, often loosen the carbureter connection, and this allows air to leak in, which destroys the suction for the carbureter and thus makes the engine miss. Two cases of similar note were brought to the writer's attention on his own motorcycles and it is thought that the same might be the trouble wih yours.

Drilling Holes in Manifold

Q—Is it possible to drill two ¼-in. holes in the manifold of a Continental 6-60 engine, spaced equally distant from the center and extremities of the manifold?

2—Is it possible to drill one ¼-in. hole in the center of the manifold?

3—What make of spring bumper is the 1919 Stutz equipped with?—Carleton Weibler, Maywood, Ill.

1—As to the possibility of doing this, yes; as to the advisability, we cannot answer, inasmuch as you do not state the purpose and you do not state which manifold, exhaust or intake. More details would be necessary to give an intelligent answer.

2—See 1.

3—This is a model made by the U. S. Auto Bumper Co., Chicago.

Vaccuum Tank on Buick 31

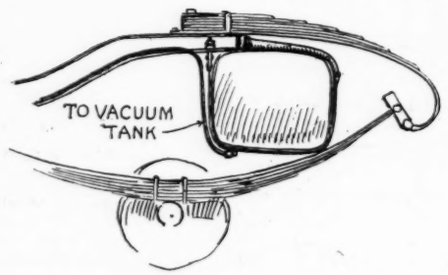
Q—I am planning to put a vacuum system on a Buick 31 with a rear gasoline tank. Give sketch showing how this can be done, as I want to raise the carbureter closer to the intake valve. There is a generator on the oil reservoir, but it will not interfere with raising the carbureter.

2—What is the proper way to adjust a model O Schebler carbureter on this Buick?—F. A. Wolfe, Dayton, Ohio.

1—The vacuum tank can be attached to the rear end of the engine, as in Fig. 1. A bracket will have to be bolted first to the engine block. To do this it will be necessary to drill and tap two holes in the block, taking care to see that the drill goes through the outer portion of the casting only. The position of the tank relative to the carbureter should be about as shown, after the intake manifold is shortened. The position of the gasoline tank is shown in Fig. 1.

2—See Fig. 2. To adjust the carbureter first see that the spark plugs are

Carburetion



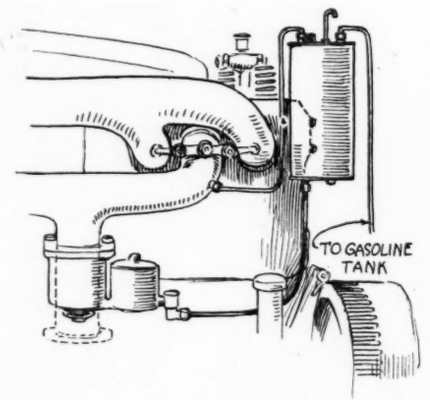


Fig. 1—Suggestion for putting vacuum system on Buick 31 with rear gasoline tank

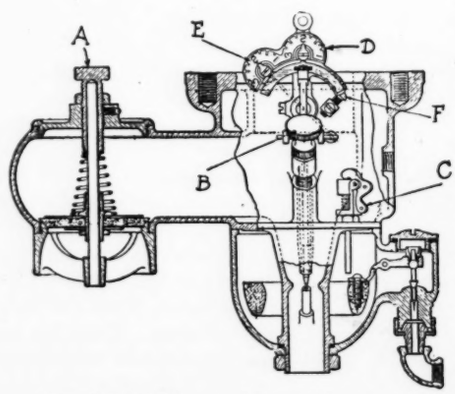


Fig. 2—Schebler model O carburetor, showing adjustments

clean and that the gap is adjusted to $\frac{1}{32}$ in. The engine must be warm. Adjust the auxiliary air valve so it seats firmly, then close the needle valve by turning the adjustment screw B to the right until it stops. Do not use any pressure on this screw after it stops. Then turn it to the left four turns, and prime the carbureter by pulling up the priming lever C and holding up about 5 sec. Then open the throttle about a third and start the engine. Close the throttle slightly, retard the spark and adjust the throttle lever screw F and needle adjustment screw so the engine runs at the desired speed and hits on all cylinders.

Carbureter Float Level

Q—This 1914 Buick B25 is equipped with a Rayfield L2C carbureter with No. 56 low speed nozzle and No. 0 metering pin. The engine idles perfectly, but will not accelerate without loading. As the No. 0 metering pin is the largest made, is there a way to remedy this? The high-speed adjustment is cut down as far as it can be, but it still gives too much gas.

2—Would changing the float level help?—John A. Thomas, Toledo, Ohio.

1—The indication is that the car is getting too much gasoline at low speeds. It is not the high-speed valve that needs attention but the low-speed. Cut down the gasoline supply until the engine just misses on idling speeds. Then increase until the backfiring stops. This will set the valves correctly.

2—Float levels are adjusted at the factory for average conditions. If your needs demand more than the average can supply, then change the level, decreasing it slightly.

Cadillac Misses—Carbureter

Q—I have tried to better running on both a 1912 and 1913 four-cylinder Cadillac, double distributer ignition, Exide battery and dry cells. Over 20 miles they miss and fail to pull, but under 20 miles they run good. I taped the wire and tightened all connections, got new spark plugs—good compression, proper spark advance and tight gasoline line, also good carbureter adjustment. The machines run worse on the battery switch through the relay on dash. Also I have to prime engine to start if standing over 30 min.

2—I have a Rayfield carbureter on a Chalmers 36 four-cylinder, just cleaned gas line tubes—bowl boat is good, but gasoline inlet valve at bowl sticks, closed at times. Give me a good cure for this trouble?—John Phillips, Yuma, Ariz.

1—We believe this is a case of carbureter adjustment. It is very probable the old-fashioned manifold cannot do the work and it needs a more efficient hot-air stove.

2—It might be the lever arm adjustment for the float is wrong. See that there are no worn pins in these connections, for if there are, the valve surely will stick.

New Manifold on Olds

Q—The Oldsmobile 44 has the manifold heated by hot water and later models have the manifold heated by hot exhaust. Is it feasible to change the model 44 so the manifold can be heated by hot exhaust by supplying new aluminum jacketed manifold to carbureter, new right and left intakes and exhaust pipe to muffler? Is the latter arrangement interchangeable with the former? The car has run only 11,000 miles.

2—Would the expense justify the change?

3—Is there any way to quiet the timing gears on the car besides installing new gears?—C. B. Furnell, Annapolis, Md.

1—Yes, this plan is entirely feasible. There are a few details of the manifold that do not make it interchangeable, but if the manifold is going to be made special, anyway, this will not work any inconvenience.

2—We believe the saving from this change will make it worth while. It must be remembered this saving is not only reflected in the increased gasoline mileage

but the lubricating oil will be saved also, in that it will not be diluted to the extent that it is now. There are no changes that one cannot make without reaping a great deal of reward because of making them, if they are steps taken for the bettering of the fuel carburetion problem. There are many cases where engines have been so cold the higher temperature compounds of the fuel would not burn, resulting in this fuel washing the oil away from the cylinder wall and leaving exposed surfaces to wear upon one another.

3—The gears probably have become worn, or else the bearings of the shafts have allowed the shafts to settle 0.001 in. or less. This will make the gears noisy, and they will hum continually.

Miscellaneous

Maxwell Number Location

Q—Where is the engine number on a Maxwell 6-50 speedster? I wish to get repairs.—Frank Englert, Gurley, Neb.

Maxwell serial numbers are on the name plate on the right end of the front seat base. The engine number is on the left side of the block, about the center.

Dario Resta's Peugeot

Q—Publish photographs of the Peugeot driven by Resta and Howdy Wilcox in 1916.

2—Has the American Grand Prix and Vanderbilt Cup ever been held on a spedway? When and where?—Roger Shaw, Hastings-on-Hudson, N. Y.

1—The Peugeot which Resta drove is shown in Fig. 3.

2—Records show that one Vanderbilt Cup race was held on a specially constructed track within the grounds of the San Francisco exposition. This was not a regular speedway track but was constructed of dirt and wood, its length being 3.905 miles.

Engine on Ford Speedster

Q—I have a 1913 Ford speedster equipped with a Bosch high-tension magneto, Stromberg carbureter and 3 to 1 gears in the rear axle. I can only get 45 to 50 m.p.h. Would larger valves and drilling holes in the pistons to connecting rods give more power?

2—Would grinding the backs of the cams and camshaft help?

3—Is a heavy or light flywheel better for speed?

4—Where can I obtain brass or babbitt camshaft bearings?

5—What effect would it have on the engine if I set the valve timing ahead one tooth?—Ray Hillman, Detroit.

1—You are not getting the proper speed. With the equipment that you now have, you should do well over 60 m.p.h. It is possible the magneto setting is wrong. A very slight difference in the setting will make a large difference in the car speed. Larger valves can be installed. It is possible to rebore the seats so Dodge valves will fit in place of the old valves. If the carbureter now on the car is of larger size than the old one, then it is necessary to increase the valve size, for the gas velocity in the carbureter will be too low with the small valves. It is not necessary to drill the rods, but the pistons may be drilled, which will cut down the engine vibration considerably.

2—No.

3—Use the present flywheel. High-speed engines have lighter flywheels than low-speed.

4—See the advertising columns of MOTOR AGE.

5—The pitch of the gears on the Ford timing system is too coarse to secure greater delicacy of adjustment than the regular setting. It is better to leave these gears alone.

TO assist readers in obtaining as a unit all information contained in this department on a certain subject MOTOR AGE segregates inquiries into divisions of allied nature. Questions pertaining to engines are answered under that head, and so on.

CARBURETION

George W. Baadte.....Andover, S. D.
Tom Payne.....Hays, Kan.
Carleton Weibler.....Maywood, Ill.
John A. Thomas.....Toledo, Ohio
F. A. Wolfe.....Dayton, Ohio
John Phillips.....Yuma, Ariz.
C. B. Furnell.....Annapolis, Md.

MISCELLANEOUS

Roger Shaw.....Hastings-on-Hudson, N. Y.
Roland A. Saye.....Athens, Ga.
Ray Hillman.....Detroit
Edward Morrow.....Alliance, Neb.
William H. Hodges.....Saratoga, Tex.
Frank Englert.....Gurley, Neb.
G. Konzelman.....Winnipeg, Manitoba
Herbert G. Hartman.....Rochester, N. Y.
C. F. Meier.....Bouton, Iowa
John D. Gerber.....Culver, Ind.
W. W. Bissell.....Zearing, Iowa
George W. Baadte.....Andover, S. D.
Vivian (Spud) Solt.....Manhattan, Kan.

THE ELECTRIC SYSTEM

R. A. Dessommes.....Monterey, Mexico
J. H. Rappild.....Newport News, Va.
McVille Auto & Supply Co.....McVille, N. D.
A. R. Sabin & Son.....Wolcott, N. Y.
George W. Baadte.....Andover, S. D.
W. S. Schultz.....Madison, N. J.
W. W. Bissell.....Zearing, Iowa
L. J. Hughes.....Coalgate, Okla.
John A. Thomas.....Toledo, Ohio
N. A. Hottna.....San Francisco, Cal.
John Phillips.....Yuma, Ariz.
F. G. Baker.....Sioux City, Iowa

ENGINES

R. C. Rhein.....Modesto, Cal.
H. Clay Penick.....Bakersfield, Cal.
William Collins.....Long Beach, Cal.
Ward Daggett.....Caldwell, Idaho

LUBRICATION

Hubert Scull.....Jordan Station, Ontario
Frank Englert.....Gurley, Neb.

No communication without the writer's name and address will be answered in these columns.

Car Serial Numbers

Q—Where is the engine number located on the principal makes of cars? Where is the car number located on the principal makes of cars?—Roland A. Saye, Athens, Ga.

It is general to look for engine numbers somewhere in the vicinity of the timing gear housing. For detailed information we advise you to look over MOTOR AGE from Jan. 16 to Feb. 20, this year. These copies gave the complete set of engine and chassis number and location of same.

Car Speeds and Race Cars

Q—What speed is the Paige 6-55 capable of? I mean the fastest model.

2—The Hudson speedster?

3—What cars use the Dusenberg engine?

4—Show side view of Dusenberg special.

5—Show three-quarter view of Cornelian light car.

6—Are there still any junior cyclecar races? If so, where, and who holds the championship?—Edward Morrow, Alliance, Neb.

1 and 2—The Hudson speedster is rather a fast car and should do about 75 m. p. h., provided conditions are right. Unless the factory makes a speed guarantee, we cannot tell how fast a car will go, but the Paige ought to make about 65, if everything is properly timed and road conditions are right.

3—Revere, Roamer Special, Duesenberg passenger and racing car.

4—See Fig. 4.

5—See Fig. 9.

6—Junior races are not given the prominence now they were. The last one, of which we have record, was held at San Francisco, Cal., in 1916. A speed of 70 m.p.h. was attained, but we have no records of the race other than this. One of the fast junior cars of that time was one owned by H. J. Yeach, Mount Carmel, Ill.

Increasing Car Speed

Q—What is the best way to increase the speed on a Buick E 6-45?

2—Instruct how to install a G-P cut-out, as the muffler is almost up against the dust pan and the engine would exhaust in the dust pan, so would this be too dangerous? The engine is in good condition.—William H. Hodges, Saratoga, Tex.

1—Increasing the speed of any engine means going over it from one end to another and putting it in the best possible condition. A good deal will depend how much of an increase is demanded or expected and for what purpose the car is to be used when additional speed is obtained. If for racing purposes, it probably would demand a change of gear ratio, different design in the camshaft, slightly enlarging the valves and valve seats, although this is hardly possible on a Buick, setting the ignition a little in advance of that ordinarily used, increasing the piston clearance to allow for the extra expansion due to increased heat, dropping the steering wheel and setting the body lower to reduce wind resistance. There are other things that

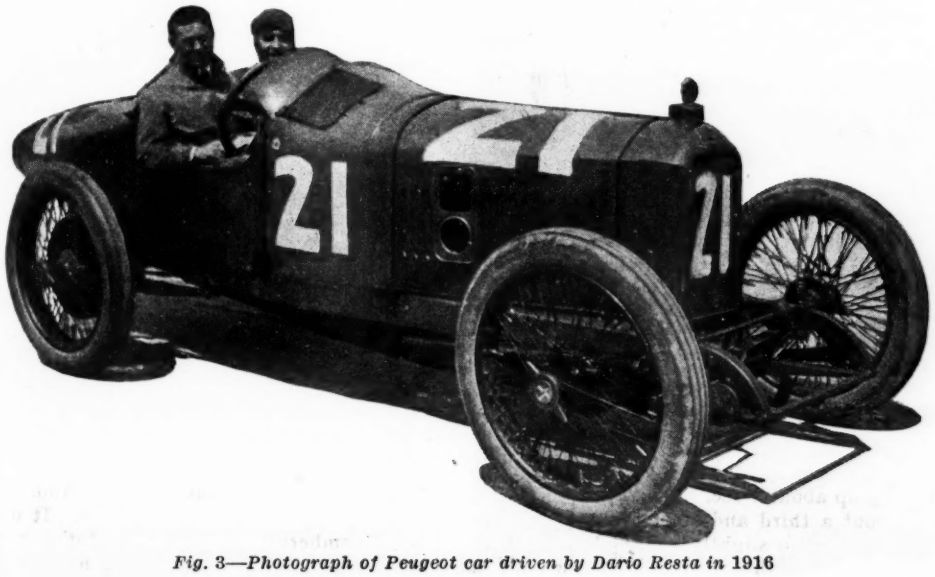


Fig. 3—Photograph of Peugeot car driven by Dario Resta in 1916

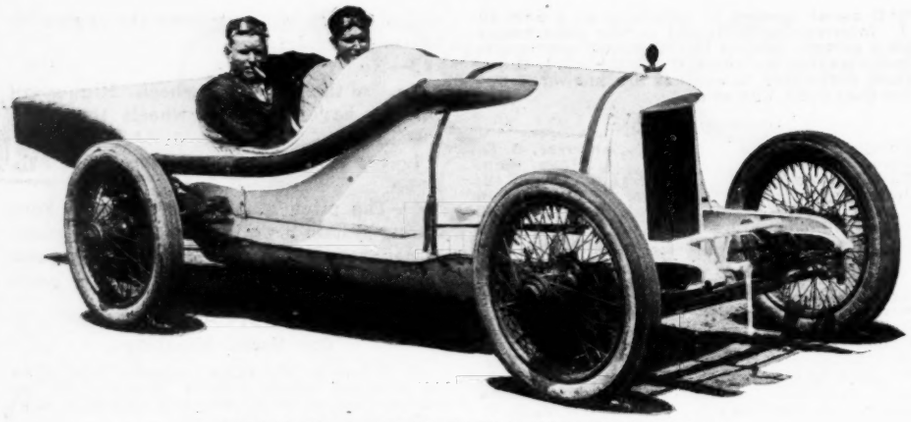


Fig. 4—View of the Duesenberg special racing car

ought to be done, such as wrapping the springs, putting on stiff shock absorbers, using wire wheels and tires of smaller diameter, putting on some form of pressure pump for the gasoline and oil systems to give adequate supply. A larger carbureter and also larger manifolds ought to be installed to get as much gas to the cylinders as possible and to take away this larger charge of burned gas.

If it is the desire merely to better the running condition of a touring car, for instance, it is another thing and while it will not call for so great an expense it will imvolve careful and patient—as well as dirty—work. Every nut and bolt should be gone over and tightened to reduce vibration, the radiator should be cleaned with a solution of washing soda, play in the throttle and ignition operating levers should be removed as far as possible, and the steering play should be taken up. These matters, corrected, will not make the car run faster but will be insurance against possible accident when it is groomed to give more speed.

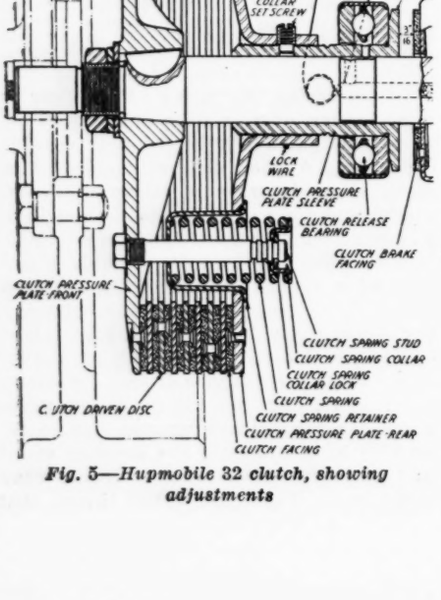


Fig. 5—Hupmobile 32 clutch, showing adjustments

The valves should be ground, valve stems made straight and cleaned, valve tappets should be free and the carbon removed from the cylinders. All the main bearings on the crankshaft should be taken up and the crankshaft lined; the connecting rod bearings also should be tightened and scraped if necessary. If there is loss of compression, perhaps the cylinders should be reground and oversize pistons fitted, or perhaps a new set of rings, lapped in, will suffice. Every wire connection should be gone over and the system tested for possible leak of current, and the timing mechanism also should be inspected. Careful adjustment of the clearance between the pushrods and the valve arms should be made, each alike and with ample clearance if hard driving is to be made. The valves should be ground with care, the carbureter and fuel system cleaned out and the vacuum system inspected for possible air leak in the lines. Careful carbureter adjustment is probably half the battle, but this cannot be obtained until all the other things have been accomplished.

If you care to sacrifice pulling power for speed, you can raise the gear ratio by installing a larger drive pinion and ring-gear to match, but this is not advisable except where the car is to be used for racing. Then it will be wise to see that there is positively no drag through the brake bands being too tight or because of dirt holding the linkage from operating. Every wheel bearing should be cleaned out and adjusted and filled with new lubricant; likewise the differential. The oil in the crankcase ought to be drained, the case flushed out with kerosene and new oil put in. After you have gone to this trouble it is not reasonable that the car will run better, faster and more economically?

2—Under the circumstances the only thing to do is to increase the length of the exhaust pipe and place the muffler far enough back to permit the cut-out to be installed back of the dust pan. This can be accomplished by the use of tubing that will fit over the exhaust pipe, sawing the latter where needed and telescoping the pipe and exhaust pipe. The joints will have to be well pinned and some form of bracket should be attached at each joint to prevent sag in the pipe. At first the joints may leak a little, but they will take up in a few days. In fitting the sleeve over the ends of the exhaust pipe it would be well to make such a tight fit when cold that it would require heating to expand the ends to get them over the pipes. Then when cold they will hold well and there will be very little chance for a leak.

Adjusting Hupmobile Gearset

Q—Explain how to adjust the clutch and gearset of a Hupmobile 32. Why do the gears jump out of intermediate and high?—G. Konzelman, Winnipeg, Manitoba.

Refer to Fig. 5, which shows a cross-section of the Hupmobile clutch. Adjustment is provided by being able to place the clutch spring retaining washer and key in different notches on the clutch spring studs. Fig. 5 shows the clutch spring collar and clutch spring collar lock. If at any time adjustment is necessary, all the springs and studs must be set the same, as otherwise the clutch operation would not be satisfactory. To tighten the clutch, the spring should be compressed and the key removed from the groove in which it is at the time and placed a notch forward. This adjustment should be made through the hand hole at the top of the gearcase. With this adjustment made on all the clutch spring studs the adjustment will be smooth and give good results.

When a gear lever will not stay in a certain speed position it is generally a sign that the teeth are worn or the shifter forks are bent, allowing the gears to mesh but partly. Inspection of the gears through the top of the case will tell you whether or not the teeth are worn or if there are parts out of line. The only remedy for worn gears are new ones.

Chandler Steering Gear

Q—Show construction of steering gear on 1917 Chandler.—Herbert G. Hartman, Rochester, N. Y.

See Fig. 6.

Probably Slipping Clutch

Q—This 1918 Chandler roadster has no limit of power on high gear, but does not seem to have power on intermediate. I can climb just as large a hill on high as on intermediate unless racing engine, or, rather, when going up to 20

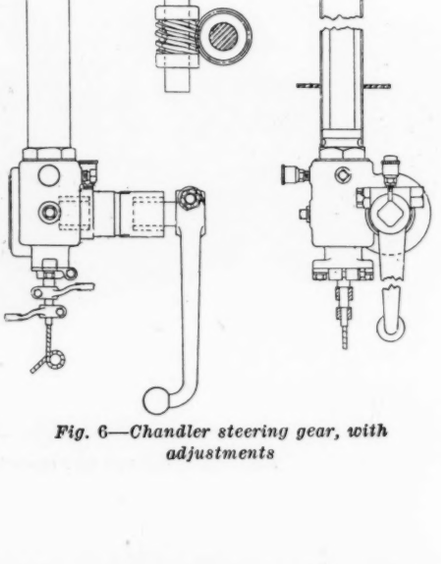


Fig. 6—Chandler steering gear, with adjustments

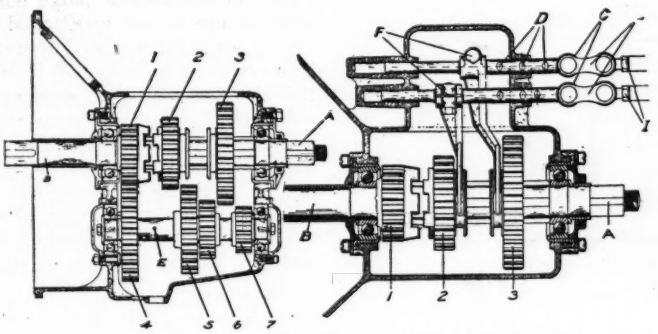


Fig. 7—Gearset on 1913 Chalmers, showing adjustments

or 25 m.p.h on intermediate. Sugest a remedy. —C. F. Meier, Bouton, Iowa.

It is, of course, unreasonable to suppose a hill can be climbed as well on second gear as on high unless something is radically wrong. There is the possibility that the mixture is too thin to permit a sufficient quantity to go to the cylinders when the engine is running faster. This, of course, can be told by a little experimenting. The difficulty in this case, however, seems to be more in a slipping clutch. The grade of the hill causes a heavier load and when in second gear the engine is permitted to turn over much faster, therefore delivering very much more power, possibly to the extent of getting beyond the holding power of the clutch. If the clutch slips, this would make it appear the engine is racing because of the vibration that would be developed. We are inclined to think if the clutch is taken up the difficulty will come to an end.

Maxwell for Truck Use

Q—What horsepower has the Maxwell Special, and would it make a suitable truck by attaching any standard make of truck unit?

2—Would a large, old-style car make a satisfactory truck, if the engine were in good condition?

3—What engine did the 1912 Velie use, and its horsepower?—George W. Baadte, Andover, S. D.

1—The size of this engine was 4¼ in. bore and 4¼ in. stroke, which under the N. A. C. C. formula would give it 28.9 hp. This pactice has worked out satisfactorily in a good many cases. The chief thing to consider is the gear ratio, and that cannot be judged until it is known what sort and how heavy loads you are to haul, the nature of the roads, whether hilly or level, and the rate of speed you expect to travel as a general rule.

2—Yes, and that has been the ultimate service performed by many old cars.

3—In the 1912 Velie the engine was a Milwaukee having a bore of 4¼ in., which under N. A. C. C. rating would be 36.1 hp., as it had four cylinders.

Transmissions and Steering Gears

Q—Instruct how to take up slack in the steering gear of 1913 Chalmers six.

2—Can play in the countershaft be eliminated in this model? How?

3—How can it be ascertained if the transmission gears of a 1916 Baby Grand Chevrolet are in proper mesh at the different speeds. The car will slip out of high at times.—W. W. Bissell, Zearing, Iowa.

1—To take up wear in this gear it is necessary to turn the adjusting nut, which holds the bearing at the point where the steering post enters the steering gear case, to the right.

2—There is a possibility that some time the transmission has run short on oil, and if that is the case, then the ball bearings

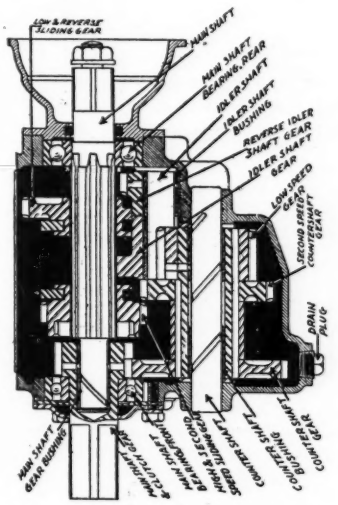


Fig. 8—Chevrolet gearset, showing adjustments

and the race might be worn, causing the play and the noise which probably accompanies it. It is also possible that some of the ball bearings might have cracked, which will cause the same result. The links on the shift forks may be out of adjustment. This will not allow the gears to mesh properly and will cause some end play. This is taken up by turning the eyebolt nuts marked I, Fig. 7.

3—See Fig. 8. This shows the transmission. The most probable reason for the lever to jump out of high speed is that the shifter lever or fork may be slightly bent, caused by someone trying to bank the gears into place. Then after the fork was bent the gears, not meshing completely, caused them to assume a beveled shape, which forces them out of mesh if the load becomes sufficiently great. The condition can be remedied partly by examining the fork and having it straightened. Then increase the tension on the retaining spring on the fork. This will allow the gears to mesh completely and the extra tension will help keep them in place.

Speeding Up Jordan

Q—Is a $3\frac{1}{18}$ to 1 gear ratio too high for a Jordan sport model?

2—How could I make it faster after putting in a high gear ratio?

3—Would two-spark magneto ignition make it faster than a single battery?—John D. Gerber, Culver, Ind.

1—The present gear ratio of your car is 3 10/13 to 1, and if the car is in good condition it should make about 70 m.p.h. If the ratio is changed to $3\frac{1}{18}$, it should make about 85, other things offering no objection.

2—Cutting down wind resistance is about all the change that ought to be made. A smaller windshield will help. We do not like to advise a change of this kind, especially when the car is built for fast work, as is the case with the Jordan sport model. The car is designed to stand safely about 70 m.p.h. For greater speeds the car should be strengthened all over. This is the advice of the Jordan company, and we second its opinion in this.

3—Assuming that you mean a double-spark ignition from a magneto as against a single ignition spark ignition from a battery, there undoubtedly will be an advantage. The flame within the cylinder will have two points from which it can spread, thus increasing the rapidity of the flame propagation. This would be true if a double spark battery system as opposed to a single-spark battery system.

Building Racing Car

Q—In building a special racing car for use on 1½-mile dirt track, would it be advisable to install a Duesenberg four-cylinder, eight-valve racing engine in a 1917 Scripps-Booth four-cylinder chassis? Wherein would the chassis be unsatisfactory?

2—Would a four-speed transmission be satisfactory so racing could be done on third or fourth speed instead of changing the ring gear and pinion to change the gear ratio for different tracks?

3—When does the racing season start in Ohio, Indiana, Illinois and Iowa and how are the racing dates to be found in this section?

4—Where could more information be obtained on dirt track racing?—Vivian (Spud) Solt, Manhattan, Kan.

1—This is altogether too much power

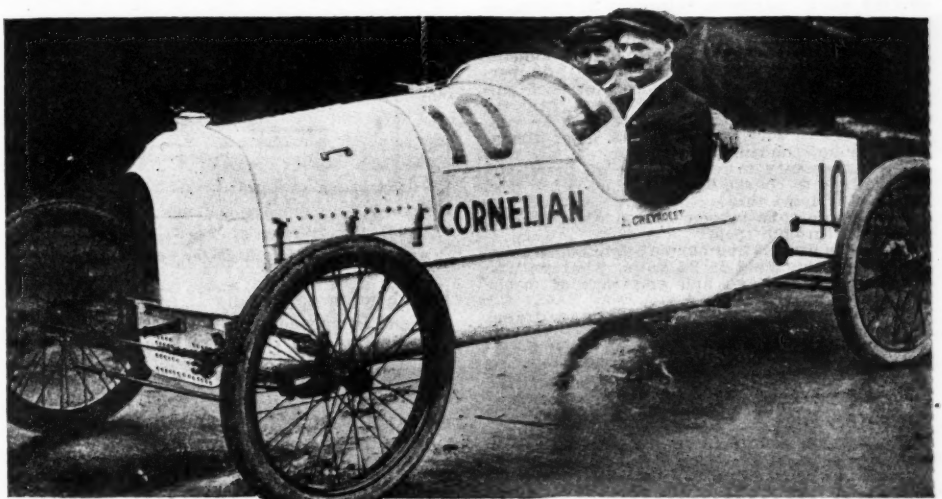


Fig. 9—Cornelian cyclecar with Chevrolet at wheel at 1915 Indianapolis race

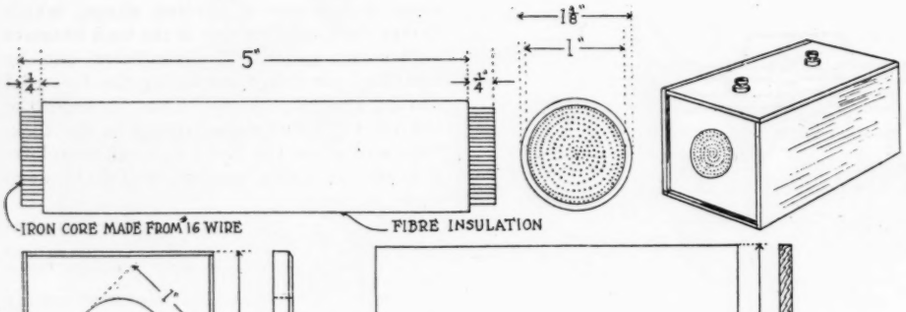


Fig. 10—Layout for choke coil, giving details as to dimensions

for that Scripps-Booth chassis; it would never stand it and would prove dangerous.

2—This would be satisfactory, provided you secured direct drive on third, for you would not want to drive through gears for any considerable length of time. Ordinarily the third speed would suffice and you would have the higher gear in reserve. This would be better for dirt track racing, as this does not permit of as high a gear ratio as would that on a speedway.

3—The opening of the racing season will be May 31, the 500-mile race at the Indianapolis speedway. Write the American Automobile Association, 531 Fifth avenue, New York, for list of dates for sanctions granted.

4—There are not many dirt track races until early in the fall, when the state and county fairs open. Bear in mind that these affairs are usually unsanctioned and that participation in them will bring suspension and possibly a fine from the American Automobile Association. If you have hopes of ever driving in the major events, you might be barred because of having participated in unsanctioned events. Ask the A. A. A. about it.

The Electric System

Choke Coil Designed

Q—Give directions for making rectifier for charging 6-volt batteries from an alternating current whose maximum voltage is 24 and minimum 16 volts. Make diagram, giving sizes of aluminum and iron plates for each ampere of direct current distance between plates, kind of vessel and displacement, electrolytic and percentage of salt that must be used for each gallon of water.

2—Describe method for making a choke coil, giving the size wire to use, B. & S. gage, dimensions, etc., of the coil.

3—If necessary to reduce value of direct current voltage to charge battery, what is the best method for doing this?

4—Why do coils become heated when current is passing through them?

5—If the alternating current obtained from a rectifier of this kind is 24 volts, what will be the maximum voltage and amperage of direct current?

6—What will the resistance be in rectifying that current?

7—May 2, 1918, an answer stated that 9-volt lamps connected in series would consume 18 volts. What does this mean, and what will be the equivalent in coulumbs and in amperehours?—R. A. Dessommes, Monterey, Mexico.

1—An iron aluminum plate rectifier will not work very well on as low a voltage as 24, and certainly not on 16 volts. This type of rectifier is not very efficient, as the liquid heats up rapidly if any considerable current is passed through, and this reduces the efficiency to the point where it becomes a question if it really is worth while to use it. If just one or two batteries are to be charged once in a while, then the question of heat loss will not be of any consequence, but if the work is to be continuous a vibrating rectifier will work much better.

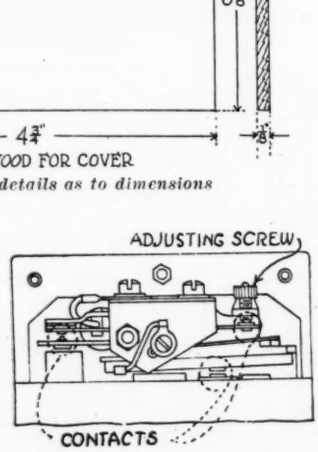


Fig. 11—Current regulator on Lexington car

Fig. 12—Brush on Simms-Huff system in Maxwell

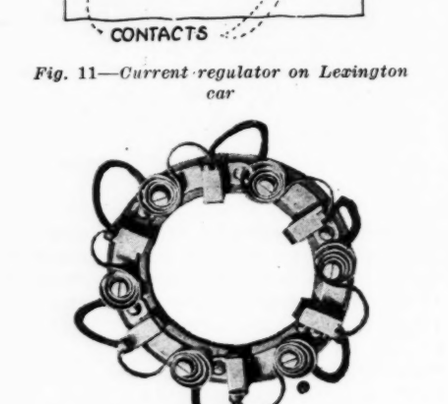


Fig. 13—Wiring of Ford magneto and Dixie high-tension

2—The size of the choke coil which you wish to use is not mentioned in your letter, so we assume it will operate on 6 volts. The action of a choke coil is produced when the circuit is broken, causing the electromagnetic lines to collapse very suddenly. As these lines collapse they return to the magnetic core from which they emanate, and in so doing they cut the wires of the coil. This sudden cutting of the wires by the lines of force produces a high voltage, and it is this that produces the spark.

To make the coil, secure about 100 ft. of iron wire, 16 B. & S. gage, and cut it up into pieces 5 in. long. This will make about 300 short pieces, and they will form into a bundle about 1 in. in diameter, about the right size for the core of the coil. Around this core an insulating sleeve must be fitted. It should be shorter by ¼ in. on each end of the core. This sleeve can be made from fiber or heavy cardboard. If the latter material is used, the cardboard should be thoroughly coated with shellac. Now fit the ends of the coil up against the shoulders formed by the sleeve. Make these ends from wood, of the size illustrated, and for neatness the edges might as well be beveled. Cut the hole in the end pieces exactly to measurement and force them over the iron core. Small pieces of wire can be driven in to set these blocks tight and the ends can be bent over to give a spreading effect, which will grip the end pieces firmly.

The wire now can be wound on the spool. If a lathe is handy, the winding process will be a matter of a few minutes, but if it is done by hand, it will take several hours. The wire for this size is No. 14, B. & S. gage, and it will take 3⅛ lb. to fill the spool. This is equivalent to 253 ft. of the wire. It is advisable to shellac every layer of wire while it is being wound. After this is completed the cover can be fitted to the ends, and the ends of the wire can be brought out through small holes left in the wood for that purpose. Binding posts or connectors then can be soldered to the wire and the connectors made fast to the casing.

3—Insert a resistance in series with the apparatus.

4—Coils of any material have a specific resistance, and it is this resistance that causes the current to heat the wire. This can be imagined better when it is likened to a friction band stopping a wheel. The energy in the wheel to be stopped is absorbed by the brake which transforms the energy into heat. The same is the case with electricity passing through a wire; if the flow is impeded, heat will be generated because of the friction.

5—The voltage resulting from an electrolytic rectifier operating on 24 volts A. C. will be very small, about 3 or 4.

6—About 10 or 15 ohms.

7—The answer meant that two 9-volt lamps connected in series would need 18 volts in order that they should operate with the proper luminosity. We cannot give the current consumption without knowing the rating of the lamp.

Headlights Burn Out

Q—The current regulator on this Lexington 6-0-17 burns out the headlights whenever I cut the generator in circuit. Explain.—J. H. Rappold, Newport News, Va.

The current regulator is out of adjust-

ment, and to bring it back into adjustment is quite a delicate operation and generally requires a skilled electric specialist. However, if you want to attempt this job yourself, refer to Fig. 11 and follow these directions: Secure a smooth nail file or a small diamond file, one on which the cutting edges are so smooth as to be imperceptible to the touch. With this file smooth the contacts indicated in the illustration. Be sure that when the contacts close lightly the electrodes make connection over their entire surface. This is important, and the success of the adjustment depends entirely on this. Now the adjustment screw can be adjusted. This is a matter of experiment, but it has been found by experiment that the approximate position of the screw can be approached by backing the screw off until the contact is just broken and then reversing the motion two turns. A slight movement either way should develop the correct charging rate.

Brush on Simms-Huff

Q—When the ground brush is lost from the magneto of the Simms-Huff system in the Maxwell car, will the generator stop its charging?—McVille Auto & Supply Co., McVille, N. D.

Fig. 12 illustrates the brush holder used on this system. If only one brush is lost, say, from the positive set, then the current will flow out from the other two positive brushes. But if three positive brushes are lost, then the generator will refuse to charge. Two brushes may be lost and the generator will still work but not with any success, because the load on that one brush will cause it to heat and burn out.

Wiring Ford

Q—Publish diagram for wiring lamps on a car on which I have installed a Maxwell body on original Ford chassis. I wish to use the Ford magneto and Dixie high-tension for ignition, electric taillight and cowllight.—George W. Baadte, Andover, S. D.

See Fig. 13. If you care to go to some extra expense, you can fit a storage battery in the circuit and thus have a source of current when the engine is not running. This would be especially valuable in keeping the taillight burning when the car is parked at night. Even a dry battery will keep this lamp burning for some time, for as soon as the car was driven the taillight could be again run off the magneto. If you fit a battery, you will need additional switches for the battery circuit.

Bulbs Burn Out

Q—Why do the dash and taillight bulbs burn out very frequently on a 1915 Buick? They have been doing this for the last two months. The headlights are not affected, burn as long and have outlasted a half dozen tail or dash bulbs. Have been particular to use correct bulbs 6-8 volts.—W. S. Schultz, Madison, N. J.

Due possibly to loose terminals, which prevent a good contact. It is probable the voltage builds up and, being in excess of the capacity of the lamp bulbs, finds an outlet through burning out the bulbs. If the terminals in the switch connecting the dash and taillights are loose, this will cause the voltage to build up, or the battery or ground connections may be loose. As an experiment try 8-volt bulbs, and if these hold, you may be sure this diagnosis is correct.

Magnetos, Low-Tension or High

Q—Why is not a low-tension magneto more efficient at low speeds than a high-tension instrument? It seems to me limited size of the secondary winding, condensers etc., on the high-tension magneto would be a point in favor of the low-tension machine using a separate coil.

2—Is it possible to reverse the polarity of an Auto-Lite generator? This instrument has the exciter field construction and to all appearances has been tampered with a great deal. The owner of this car claimed it has been wired every way he could devise.—W. W. Bissell, Zearing, Iowa.

1—A high-tension magneto can be so designed that it will deliver just as much current and as high a voltage as a low-tension magneto with its external coil condenser. For dual systems where it is desired to render starting easier the low-tension magneto, with its independent coil capable of operating on either the magneto current or battery current, serves an ideal purpose. In France the high-tension magneto is found to be in use for starting as well as for general running.

2—If the owner has tampered with the generator a great deal, it is a safe wager the polarity of the generator is now reversed. It is possible to reverse any generator simply by reversing the connections of the field or the armature. If both these elements are reversed, however, the relative effects of the generator armature upon the field remain the same, and the polarity will not be changed. It is generally easier to reverse the direction of flow in the field than in the armature because the current in the field is much less and the connections are easier to make.

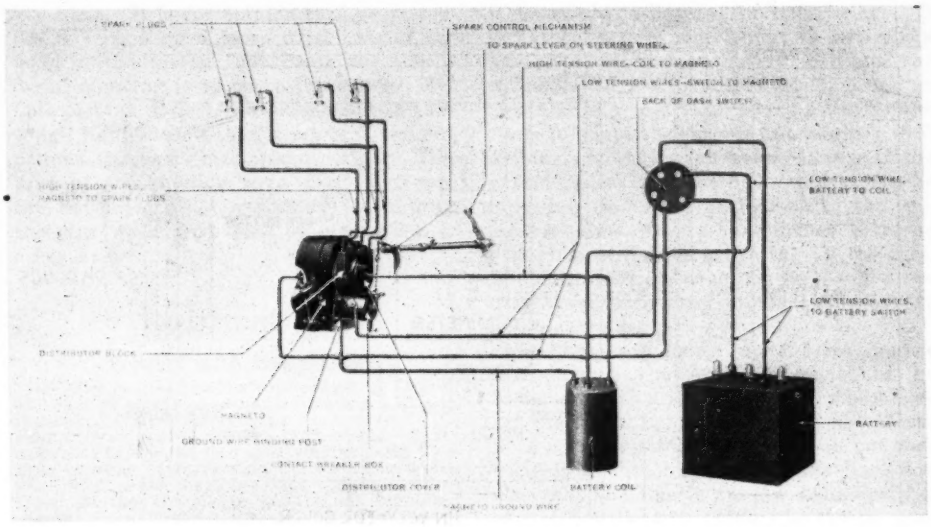


Fig. 14—Wiring diagram of ignition system on Chalmers of 1912

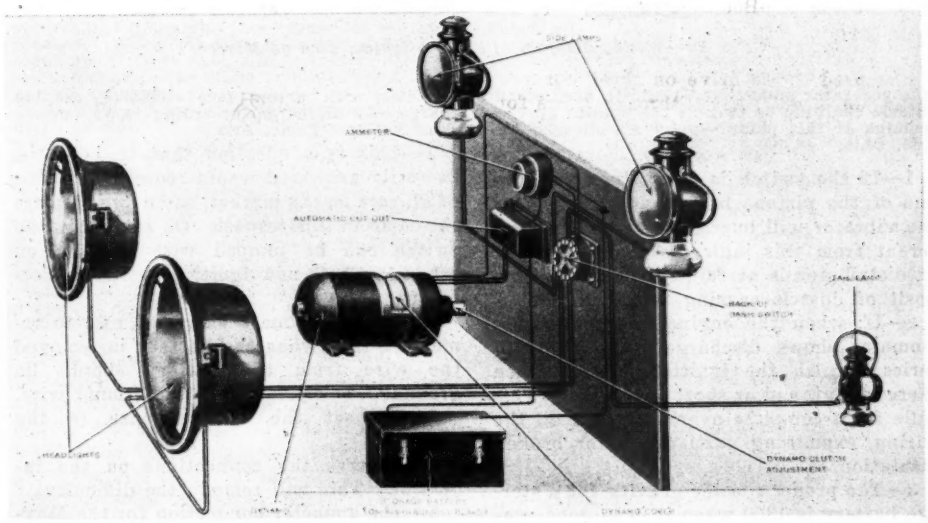


Fig. 15—Wiring diagram of lighting system on Chalmers of 1912

Chalmers Magneto Grounded

Q—Publish wiring diagram of Vesta generator, belt-driven, on a 1912 Chalmers.

2—My car is equipped with Bosch ignition, and when the battery wire is hooked to the coil it buzzes with coil turned on, without the ground wire connect. Explain.—A. R. Sabin & Son, Wolcott, N. Y.

1—Fig. 15 shows the wiring diagram of the lighting system used on your car.

2—It seems that there must be a circuit that is grounded somewhere. It is possible this may be in the contact breaker, caused by a deposit of dirt or an oil film. The wire itself may have an impaired insulation at the magneto connection point, and this may be causing the trouble. Check up your wiring from Fig. 14 and clean out the contact breaker and its housing. If it seems necessary, replace the ground wire and make sure the insulation on the wire is good.

Correcting Buick Vibrator

Q—The ignition relay on my 1914 Buick B25 vibrates whether the engine is running or not. Is this proper for this type of car?

2—When the engine is running and wires from dry cells connected through an ammeter, it shows a current. Is there a short in the storage wiring?

3—Is a storage battery that is kept at 1250 by

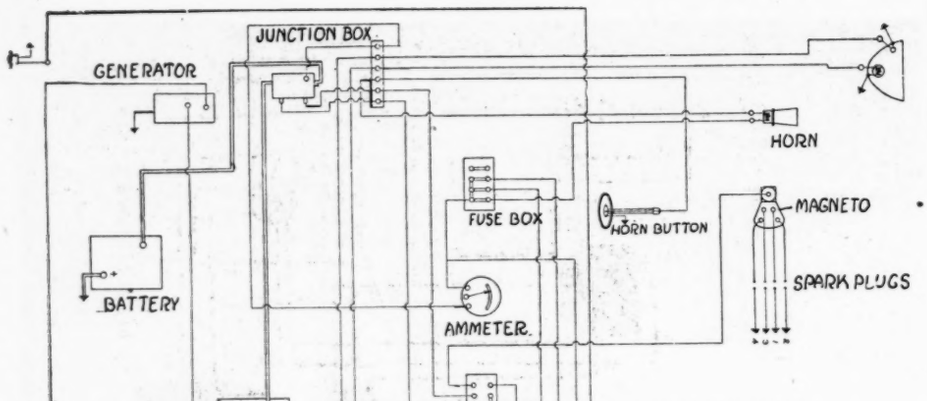


Fig. 16—Wiring diagram of electric system used on Mercer

the generator undercharged and in need of any outside charging as long as the specific gravity remains at this point?—John A. Thomas, Toledo, Ohio.

1—If the switch is on battery and any one of the pistons in firing position, then the vibrator will buzz. Any condition different from this indicates that the timer or distributer is at fault. Probably a deposit of dust is causing the trouble.

2—If, when the engine is running, the ammeter shows discharge while dry batteries furnish the ignition current, then there is a ground or short somewhere. This calls for a complete overhauling of all the wiring, examining particularly for broken insulation.

3—The proper specific gravity for a storage battery is 1300 when it is in good condition. This may run as low as 1280 after the battery becomes old, but 1250 is too low to indicate perfect battery condition. The plates may be sulphated from overcharging, or there may be sediment in the bottom of the cells. This causes a slight current leakage that constantly drains the battery. Have the battery fully charged to 1300, and then see if it runs down. If so, the generator may need boosting.

Ignition on Closed Fords

Q—Does the ignition on the 1919 closed Ford come from the storage battery or from the old-type flywheel magneto?—L. J. Hughes, Coalgate, Okla.

The Ford closed models equipped with electric starter and generator, have the ignition operating from the magneto similar to former practice.

Starting Without Key

Q—Without a key what is the quickest and simplest way of starting the average car having battery generator systems?

2—How do wires connect to operate car, and not damage generator if the battery is taken from car for a period of charging?

3—If the battery is removed on an Overland model 83, having a magneto for ignition and battery for lights and starter, will it be necessary to hook up wires from generator to run?

4—While starting a Dodge, the dash indicator reads charge—when engine is running the register is discharge—the wiring corresponds with diagram. I think it is wrong in the indicator roller. What is the most positive manner of knowing and easiest way to repair?

5—A 1918 Maxwell has indicator on dash reading off and charge. I would like to install ammeter with arrow face clocklike, reading charge and discharge, according to car use.—John Phillips, Yuma, Ariz.

1—This is a question that to be satisfactorily answered would require a resume of all cars on the market, as no two cars are the same in this respect. On some cars the switch can be jumped with a wire; on others a whole new ignition system is necessary.

2—It is an almost universal rule to remember that when the battery is removed the wire from the battery should be grounded, or connected to the ground wire.

3—Connect the battery wire to the frame.

4—Reverse the connections on the indicator. This will remedy the difficulty.

5—The ammeter connection for the Maxwell was shown in MOTOR AGE April 3.

Lacks Starting Spark

Q—My Overland 75 will not start on magneto unless it is hot and has not the spark it should have. The magneto will start the car, no matter how cold it is if I have another car pull it or start it down hill and put in low gear. It will not start in high or intermediate but will when put in low. Should I get a different magneto or would it be better to put on a battery system and take off magneto? The magneto fires regularly when started and never misses no matter how slow you throttle down. I have to run with the choke partly open or the engine will stop.

2—Can I wire off of the battery and leave the magneto on or is the battery wiring system better?

3—Publish diagram for Overland 75.—F. G. Baker, Sioux City, Iowa.

1—The magneto has been off at some time or other and the magnets removed and no care taken to see that the magnets were supplied with a piece of steel across the poles to retain the magnetism. The magnets can be recharged by placing them on an electro-magnet, care being taken to see that the poles are not reversed.

2—It does not seem necessary to replace the magneto with a battery set. Magnetos and battery ignition are on a par as far as reliability is concerned.

3—This is shown in Fig. 17.

Engines

How Engine Speed Is Varied

Q—Why is it that the speed is changed in an internal combustion engine with the opening and closing of the throttle, the partial vacuum caused by the downward stroke of the piston on the suction stroke being displaced by a perfect combustible mixture in both cases?

2—An Overland 90, 1918, car has a tapping noise similar to a valve tap. The service man having had the car under advisement, a new camshaft and camshaft bearings were put in, also new pushrods and pushrod guides. All other bearings were taken up and gone over, fiber tappets were put in, valves ground, new springs put in, but to no avail. The same noise still exists at all engine speeds.—R. C. Rhien, Modesto, Cal.

1—It is the difference in the volume of the explosive mixture that determines, with other things, of course, the power delivered. If the throttle is half open, only half a charge enters the cylinders and consequently when it is compressed and fired the expansive force is that much less, or approximately so. Naturally the more gas taken and compressed in a given space the greater will be the force when expansion takes place.

2—It is almost impossible to locate such a noise as is described without actually running the car and engine and being on the spot. Even then it is sometimes hard to find. The writer has been trying for two years to locate just such a tapping noise and has been unsuccessful. It is no better and no worse than when first discovered, and so it is one of the things that ceases to worry—chiefly because whatever is done seems to avail nothing. The use of a stethoscope might locate the misbehaving spot. Or take a bar of iron about 20 in. long and $\frac{3}{16}$ in. in diameter and with one end between the teeth put the other around the spot on the engine whence the noise seems to come, of course, while the engine is running. There is a probability you can come pretty near locating the exact spot.

That Mysterious Knock!

Q—This Franklin 1913 6-38 has a knock. Some six months ago I had the engine overhauled by the best local mechanic. We checked up all common causes of knock, such as piston slap, loose bearings, piston rings, end play in camshaft and crank, loose flywheel, etc. We found plenty causes for our trouble, such as loose bearings and piston pins, and corrected them, also made close adjustment on valves. We also put crank in lathe and found it to be true. However, we failed to stop the knock, which is metallic in sound. With very little driving, about 2,000 miles, we found connecting rod bearings and piston pins loose again. This does not seem to cause engine to make any more noise than when first repaired, and we were positive of perfect fitting parts. We did not examine the oil pump, which is driven by camshaft. This knock comes and goes at almost any speed but is usually with us. We do about 12 to 22 m.p.g. and use best oil and get about 600 m.p.g. There is plenty of power and the engine cools reasonably well.

2—Would it be possible or practicable to use the Dyneto starting motor and generator found on this car as small power motor for running light machinery, using current from lamp socket of city electric system?

3—The sight feed on dash of this car is usually black and does not serve purpose for which it is intended. I have cleaned the glass several times and watched the flow of oil, which is somewhat irregular. However, we never burned out a bearing or had a piston seize, etc., that could lead us to think pump was out of condition for any great length of time.—William Collins, Long Beach, Cal.

1—There are a thousand-and-one things that will cause an engine knock, and it is pretty difficult to determine at such a long range just what is the cause. There is a possibility the connecting rods are not square with the crankshaft, and if not, this would cause the excessive wear on the connecting rod bearings. It is not enough in going over an engine to thoroughly fit the bearings of the roads to the crankshaft; they must be squared to the shaft as well, else there will be a diminished bearing surface. There may be a perfect fit when

the rods are not attached to the pistons and the latter in the cylinders, yet when they are in place they may be held to one side and thus only a part of the bearing may touch the crankshaft, which naturally will cause wear and looseness in a short time. The fact, however, that you are getting only from 12 to 22 m.p.g. indicates that the carbureter is not properly adjusted, for this is too little mileage for this car; in fact, you ought to get at least 25 to 30 m.p.g. Such being the case, there is too heavy a mixture and this would cause a knock and also would be responsible for cooling only "reasonably well." We are inclined to believe that most of your trouble is in the adjustment of the carbureter, provided the ignition is found to be correct as to time.

2—Hardly, inasmuch as this is a 12-volt system and no city electric light plant delivers a current with so low a voltage. The only way to utilize the motor as a power-plant would be to interpose enough resistance to reduce the current so it did not exceed 12 volts at the starting motor.

3—There is nothing unusual about the color of the oil passing through the sight feed, for perfectly fresh and clean oil would be black in an hour's running. Nor is it stronge that the flow should be more vor less intermittent, for this would follow the speed of the engine to a large extent. There is a possibility that a slight air leak is present, and if so, this will be one cause for irregular oil flow. However, if there is a steady stream of oil through the sight gage we do not think there is much cause for alarm. You are getting none too much mileage on the oil, for you should do better than 600 m.p.g.; yet this consumption is proof that there is a sufficiency unless there is evidence of an excessive leak somewhere.

Lapping in Cylinders

Q—In your March 27 issue in regard to lapping in a cylinder you say use grinding compound. Would it not be better to use ground glass and oil, as it would be easier to remove from the cylinder walls?—H. Clay Penick, Bakersfield, Cal.

Ground glass, carborundum or grinding compound will do for lapping cylinders, the chief point being that the material be the finest procurable, whatever is used. There would be little difference between the various kinds in the matter of cleaning after the work is finished.

Ringing Knock in Piston

Q—At a given distance does an engine going at a slow rate of speed burn the same amount of gas as it would at a faster rate of speed?

2—This Cole eight has a ringing knock at all rates of speed. It is irregular, more like backlash in the timing gears. We put on new gears, also new chain, which drives the fan and generator, but this did not stop the knock. Could this be a piston pin? The bearings were taken up. Nothing that has been done has had any effect on the knock. This engine does not run at a steady speed, and when it is pulling evenly there is no knock but when the backlash comes the knock is there.—Ward Daggett, Caldwell, Idaho.

1—Every gasoline engine has a most economical running speed. Designers and engineers construct their cars so the average touring speed of 22 to 24 m.p.h. is reached at the most economical engine speed. This economical point is obtained from the engine power and fuel consumption curve.

2—Backlash in the timing gears would not cause a ringing knock such as you say you have. It is our opinion that your trouble is caused by a loose wrist pin, or the boss in the piston that holds the pin is worn, allowing it to make this noise. The Cole pistons of cast iron, machined so they weigh hardly more than a set of aluminum pistons the same size would weigh. This kind of construction is productive toward the development of a ringing noise when the pins wear, from lack of lubrication or other neglect.

Lubrication

Trouble with Lubrication

Q—The lubrication system used on an Empire 31 has been giving considerable trouble. The oil is pumped from a reservoir on the bottom of the engine by a plunger pump that works off the camshaft to a sight feed gage on the dash. This gage consists of three drip glasses from which pipes lead to the main bearings. Here is where I am having trouble in getting oil regulated evenly through these glasses. At the top of these glasses are oil guides which screw up or down. At present I have them screwed down as low as possible, and even at that it is hard to keep oil flowing through them evenly. I have gone over the whole system and cleaned everything thoroughly so there is nothing plugged. When oil gets a certain height in crankcase it flows back into reservoir. Does it matter whether the oil is pumped fast or slow to main bearings?

2—Is the oil supposed to be regulated so it drops so many drops a minute through the oil guides? The oil goes through in a very small stream now. The car has only been run 14,000 miles. Cylinders and pistons seem to be in perfect shape. I have fitted three patented rings to each piston, but oil seems to get past the rings as plugs get sooted quickly and engine smokes. This engine has never been run without oil.

3—Is there any other make of dash sight gage that would give better satisfaction than the gage now in use?—Hurbert Scull, Jordan Station, Ont.

1—The rate of flow of oil is and should be in proportion to the engine speed. If there is a constant flow, more or less, it should be sufficient, for the lead to the sight feed is through one pipe, and this branches into three. It is natural that with this division of outlet there should be something of an intermittent flow. If your pistons and cylinders are in perfect shape, it indicates there is sufficient lubrication. At low engine speeds there need not be such a fast flow, while running at higher speeds naturally would call for more oil.

2—If the oil goes through in a small stream, this is sufficient; a few drops will not suffice in this system. An excess cannot do damage because it will find its way into the reservoir and nowhere else. Oil getting past the rings has very little relation to the oiling system or how it works; it is usually a case of ill-fitting rings. It is not enough to merely put in new rings and stand on that argument. Perhaps the cylinders were a trifle out of true, and in this case it would take a long time for the rings to adapt themselves to a slightly oval cylinder, if they ever would. Even if the cylinders are true, the new rings should be lapped in to insure perfect fit to the cylinders. How far you have driven with the new rings will have a bearing on the case. If only a short distance, the rings will probably wear their way to the shape of the cylinder walls.

3—There are many sight feeds on the market, but you probably would be no better off with another make. Try eliminating the faults named first and you will not need a new sight feed. Also, look out that there is no small air leak in the lines and also that the line is not air bound, either of which will cause trouble in the oil flow.

Maxwell Plugs Foul

Q—What kind of a carbureter will work best and give the most speed on a Maxwell 6-50 speedster?

2—The two middle cylinders foul plugs every 200 miles or so. What causes this?

3—What is the bore and stroke?

4—What size are the rings?

5—What kind of pistons will work best in this engine, cast or aluminite?

6—Will aluminum pistons last as long as cast?—Frank Englert, Gurley, Neb.

1—We are not able to tell what kind of carbureter will work best with your Maxwell, but why not try some one of the popular racing-type carbureters.

2—Oil is causing the fouling. Now whether the oil is caused by score marks, poor rings or worn cylinder walls we cannot say, because you give us no further information. But one of these you will be sure to find when the engine is torn down.

3—Three and five-eighths in. bore and 4½ in. stroke.

4—The ring size is 3⅝ by $\frac{5}{16}$ in.

5—Aluminum alloy pistons, if correctly fitted, weigh considerably less than iron pistons and will increase the accelerative performance of the car. This is not an opinion but an established fact. Four cylinder engines have an inherent vibration that increases as the weight of the reciprocating masses increase, and if this weight is reduced, the engine is enabled to run so much faster.

6—If properly fitted, aluminum alloy pistons should last as long as iron pistons. The difficulty is that the ordinary garage mechanic cannot fit these pistons.

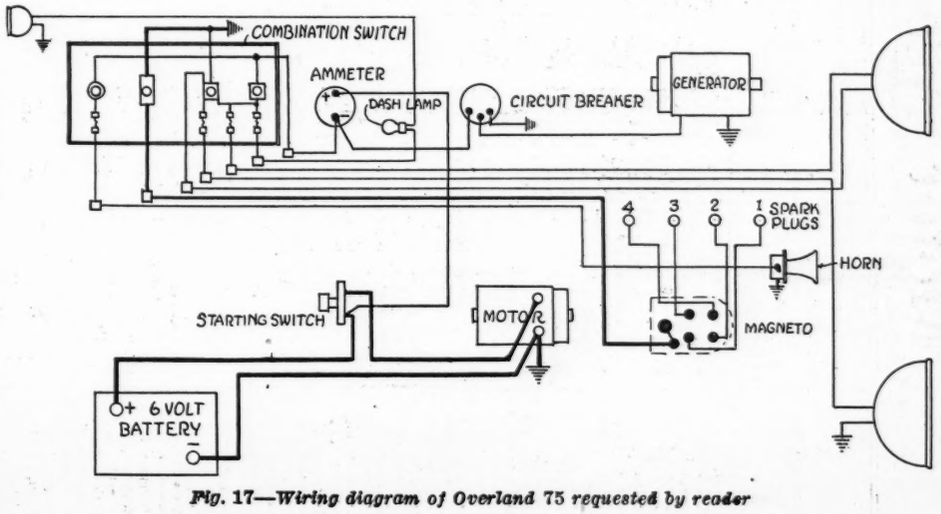


Fig. 17—Wiring diagram of Overland 75 requested by reader

Motor Age Monthly Guide to Truck Specifications

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carbureter	Clutch	Gearset	Final Drive	Axle	Steering Gear
A. & B., 3T	3	.....	48x3½d	48x3½d	Own	4-5 .17x4½	Bosch	none	none	Scheb.	none	Own	in-g.	Own	Gem.
A. & B., 5T	5	.....	48x3½d	48x5d	Own	4-5 .17x4½	Bosch	none	none	Scheb.	none	Own	in-g.	Own	Gem.
Acason, H	2	.....	36x4	36x7	Wauk.	4-4½x5½	Eise.	Nlite.	Wauk.	Scheb.	Muncie	Muncie	worm	Timkn.	Ross
Acason, L	3½	.....	36x5	36x5d	Wauk.	4-4½x6½	Eise.	Nlite.	Wauk.	Scheb.	Muncie	Muncie	worm	Timkn.	Ross
Acason, M	5	.....	36x6	40x6d	Wauk.	4-4½x6½	Eise.	Nlite.	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Acason, R	1	.....	36x3½	36x5	Wauk.	4-3½x5½	Eise.	none	Wauk.	Scheb.	Fuller	Fuller	worm	Timkn.	Ross
Acason, Tractor	6	.....	36x4	36x7	Wauk.	4-4½x5½	Eise.	.....	Wauk.	Scheb.	Muncie	Muncie	worm	Timkn.	Lavn
Acason, Tractor	10	.....	36x5	36x5d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Scheb.	B.&B.	Cotta	worm	Timkn.	Ross
Acme, B	1	$1,950	34x3½	34x5	Cont.	4-3½x5	Eise.	G&D	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, A	2	2,750	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, C	3½	3,650	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Acme, E	5	4,750	36x6	40x6d	Cont.	4-4½x6	Eise.	.....	Duplx.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
Air-O-Flex, 188	2	.....	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Cont.	Ray.*	B.&B.	Cotta	worm	Timkn.	Ross
All American, AA	1	1,295	33x4*	32x4	H-S	4-3½x5	A-K	Bijur*	Duplx.	Strom.	Hoosier	B-Lipe	in-g.	Timkn.	Ross
American	2	.....	36x4	36x7	Buda	4-4½x5½	Dixie	none	none	Strom.	B.&B.	G-Lees	in-g.	Russel	Lavn.
American	3½	.....	36x5	36x5d	Buda	4-4½x5½	Eise.	West.	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Torbn.	Ross
American	5	.....	36x6	40x6d	Buda	4-4½x6	Eise.	West.	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Armleder, HW	2	.....	36x4	36x4d	Cont.	4-4½x5½	Eise.	West.	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Armleder, KW	3½	.....	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Atlas, 19	½	1,135	32x4*	32x4*	Lyc.	4-3½x5	Eise.	none	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Atterbury, 7R	1½	2,575	36x3½	36x5	Cont.	4-4½x5½	Remy	Remy*	.....	Carter	B-&B.	Own	d-rd.	Hess	Lavn.
Atterbury, 7C	2	2,975	36x4	36x4d	Cont.	4-4½x5½	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury, 7D	3½	3,875	36x5	40x5d	Cont.	4-4½x5½	Eise.	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Atterbury, 8E	5	4,975	36x5	40x6d	Cont.	4-4½x6	Eise.	Delco	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Autocar, XXI-F	2	2,050	34x4	34x5	Own	2-4½x4½	Bosch	none	none	Zenith*	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Autohorse, 10	5	2,100	34x10	.....	Cont.	4-3½x5	Koko.	none	opt.	Strom.	Own	Own	d-rd.	Own	Own
Available, 1	1	2,250	36x3½	36x5	Cont.	4-3½x5	Bosch	.....	.....	Strom.	B.&B.	Det.	in-g.	Own	Own
Available, 2	2	2,950	36x4	36x6	Cont.	4-4¼x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Available, 3	3½	4,200	36x5	40x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Available, 5	5	4,900	36x6	40x6d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Beck, A	1	1,550	34x3	34x4	Cont.	4-3½x5	.....	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Beck, B	1½	1,950	34x3½	34x5	Cont.	4-3½x5	.....	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Beck, C	2	2,250	36x3½	36x6	Cont.	4–	Bosch	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Beech Creek, 3A	3	3,850	36x6	36x6	Wauk.	4-4½x5½	Bosch	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Bessemer, G	1	1,450	34x3½	34x4	Cont.	4-3½x5	Eise.	.....	Wauk.	King*	B.&B.	Own	bevel	Own	Own
Bessemer, H	1½	1,945	36x3½	36x5	Cont.	4-3½x5	Split.	none	none	Zenith	Fuller	Fuller	in-g.	Torbn.	Ross
Bessemer, J	2	2,490	36x4	36x4d	Cont.	4-3½x5	Split.	opt.	none	Zenith	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bessemer, K	3½	3,450	36x5	36x5d	Cont.	4-4½x5½	Split.	opt.	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bethlehem, D	1½	1,965	34x3½	34x5	N.A.	4-3½x4½	Split.	opt.	Pierce	Ray.	B.&B.	B-Lipe	in-g.	Torbn.	Ross
Bethlehem, E	2½	2,365	34x4	34x6	N.A.	4-4 x4½	A-K	G&D*	Mon.	Scheb.	B.&B.	Det.	in-g.	Russel	Lavn.
Bethlehem, F	3½	3,465	34x4	34x5d	N.A.	4-4 x4½	A-K	G&D*	Mon.	Scheb.	B.&B.	Det.	in-g.	Russel	Lavn.
Bourne, VM	2	3,500	36x4	36x8	Herc.	4-4½x6	A-K	G&D*	Mon.	Scheb.	B.&B.	Det.	in-g.	Russel	Lavn.
Bourne, XM	3½	4,200	36x5	36x10	Herc.	4-4 x5½	Eise.	Entz*	Simplx.	Zenith	Entz	Entz	worm	Timkn.	Ross
Brinton, H	1	1,500	33x4½*	33x4½*	Wis.	4-4½x5½	Eise.	Entz*	Simplx.	Zenith	Entz	Entz	worm	Timkn.	Ross
Brinton, F	2½	3,000	36x4	36x6	Cont.	4-3½x5	.....	.....	none	.....	.....	.....	worm	Timkn.	Ross
Briscoe, 4-24	½	885	31x4*	31x4*	Own	4-4½x5½	Bosch	.....	Pierce	.....	.....	.....	worm	.....	.....
Briscoe, T-34	1	.....	33x4*	34x4	Own	4-3 7/8x5½	Conn.	A-L*	none	Buick	Own	Own	bevel	Own	Own
Brockway, J2	1½	2,450	36x3½	36x5	Cont.	4-3½x5	Conn.	A-L*	Own	Buick	Own	Own	in-g.	Russel	Lavn.
Brockway, S	1½	4,850	36x6	40x6d	Cont.	4-3½x5	Eise.	none	none	Scheb.	Hart	B-Lipe	worm	Timkn.	Gem.
Brockway, K3	2	2,850	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Duplx.	Scheb.	B-Lipe	B-Lipe	worm	Shel.	Gem.
Brockway, R	3½	3,750	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	none	Scheb.	Hart	B-Lipe	worm	Timkn.	Gem.
Brockway, T	5	4,850	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	none	none	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Chase, A	1	1,725	36x3½	36x5	Wauk.	4-4½x6	Eise.	.....	Duplx.	Car.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Chase, C	1½	2,025	36x3½	36x6	Wauk.	4-3½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Chase, B	2½	2,475	36x4	36x4d	Buda	4-3½x5½	Bosch	.....	Mon.	Strom.	B.&B.	Cotta	worm	Snel.	Lavn.
Chase, X	3	2,800	36x4	36x5d	Buda	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Chase, O	3½	3,000	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Salsby.	Lavn.
Chevrolet, T	1	.....	31x4*	32x4	Own	4-3½x5½	Bosch	Dneto.*	Mon.	Strom.	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Clydesdale, 45	1½	.....	36x3½	36x5	Cont.	4-4¼x5½	Remy	A-L*	Mon.	Zenith	Own	Warner	worm	Ind.	Warn.
Clydesdale, 65	2	.....	36x4	36x4d	Cont.	4-4½x5½	Lau.	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale, 90	3½	.....	36x5	40x5d	Cont.	4-4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Clydesdale, 120B	5	.....	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Own	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Collier, 16	1½	$1,375	33x4½*	33x4½*	Lyc.	4-3½x5	Conn.	A-L*	.....	Zenith	B.&B.	G-Lees	worm	Chego.	Dtw.
Columbia, F	1	1,750	32x3	32x4	Cont.	4-3½x5	Dixie	.....	Pierce	Shake.	B.&B.	Covert	in-g.	Russel	Own
Gabriel, F	4	4,300	36x5	40x6d	Buda	4-4½x6	Bosch	L-N*	Duplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Garford, 75-C	1	2,500	34x4½*	36x4	Buda	4-3¾x5½	Split.	West.	Duplx.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Garford, 66-B	1½	3,000	36x3½	36x5	Buda	4-3¾x5½	Split.	West.	Duplx.	Ray.	B-Lipe	Own	worm	Timkn.	Ross
Garford, 70-B	2	3,300	36x4	36x7	Buda	4-4¼x5½	Split.	West.	Duplx.	Ray.	B-Lipe	Own	worm	Timkn.	Ross
Garford, 77-C	3½	4,300	36x5	40x5d	Wis.	4-4¼x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Garford, 68	5	5,000	36x6	40x6d	Wis.	4-4¼x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Garford, 69	6	5,300	36x6	40x7d	Wis.	4-5 1/16x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	chain	Own	Ross
Garford Trac, 70-B	4½	3,400	36x4	36x7	Buda	4-4¼x5½	Split.	West.	Duplx.	Ray.	B-Lipe	Own	worm	Timkn.	Ross
Garford Trac., 77	7	4,400	36x5	40x5d	Wis.	4-4¼x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	Own	worm	Timkn.	Ross
Gar. Trac., 68	10	5,100	36x6	40x6d	Wis.	4-5 1/16x5½	Eise.	West.	Duplx.	Ray.	B-Lipe	B-Lipe	chain	Own	Ross
Gary, F	1	.....	36x3½	36x4	Cont.	4-3½x5	Eise.	Vesta	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Gary, G	1½	.....	36x3½	36x5	Buda	4-4½x5½	Eise.	Vesta	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Gary, H	2	.....	36x4	36x6	Buda	4-4½x5½	Eise.	Vesta	Simplx	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Gary, HU	2½	.....	36x4	36x7	Buda	4-4½x5½	Eise.	Vesta	Simplx	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Gary, K	3½	.....	36x5	36x5d	Buda	4-4½x6	Eise.	Vesta	Duplx.	Strom.	Fuller	Fuller	worm	Shel.	Lavn.
Gem	¾	675	31x4*	31x4*	G.B.S.	4-3¾x4½	Conn.	Dneto.*	.....	Car.	B.&B.	G-Lees	bevel	W-W.	Fost.
Geneva, 1	1	.....	34x2	36x2½	Beav.	2-5½x4½	Simms	.....	.....	Scheb.	Warner	.....	chain	Shel.	.....
Giant, 15	1½	1,850	34x3½	34x5	Cont.	4-3½x5	Eise.	Det.	.....	Scheb.	WG Co.	WG Co.	worm	Timkn.	Jacx.
Giant, 14	1½	2,400	34x3½	34x5	Cont.	4-3½x5	Eise.	Det.	.....	Scheb.	WG Co.	WG Co.	worm	Timkn.	Jacx.
Giant, 16	2½	2,850	36x4*	36x7*	Cont.	4-4½x5½	Eise.	Det.	.....	Scheb.	WG Co.	WG Co.	worm	Timkn.	Jacx.
Giant, 17	3½	3,850	36x5	36x5d	Cont.	4-4½x5½	Eise.	Det.	Pierce	Strom.	WG Co.	WG Co.	worm	Timkn.	Ross
Globe, A	1	1,490	34x3½	34x4	Cont.	4-3½x5	Eise.	.....	Pierce	Mast.	B.&B.	Cover	in-g.	Clark	Lavn.
Globe, B	1½	1,850	36x3½	36x5	Cont.	4-3½x5½	Eise.	.....	Pierce	Mast.	B.&B.	Cover	in-g.	Shel.	Lavn.
Globe, C	2	2,190	36x4	36x6	Cont.	4-4¼x5½	Eise.	.....	Pierce	Mast.	B.&B.	Cover	in-g.	Clark	Lavn.
G. M. C., 16	1	1,495	35x5*	35x5*	Cont.	4-3½x5	Eise.	.....	Mon.	Own	Own	Own	bevel	Own	Own
G. M. C., 21	1	2,025	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Lavn.
G. M. C., 31	1½	2,395	36x3½	36x5	Cont.	4-3½x5	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Lavn.
G. M. C., 41	2	2,725	36x4	36x4d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Lavn.
G. M. C., 71	3½	3,750	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Lavn.
G. M. C., 101	5	4,350	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	Mon.	Marvel	Own	Own	worm	Timkn.	Lavn.
Gramm-B., W	1½	1,895	36x3½	36x5	Cont.	4-4¼x5	Eise.	.....	Mon.	Marvel	Own	Warner	worm	Timkn.	Lavn.
Gramm-B., W	2	2,750	34x4	34x31d	Wauk	4-3½x5½	N. E.	.....	none	Strom.	Fuller	Fuller	in-g.	Clark	Ross
Gramm-B., W	2½	3,350	36x4	36x41	Wauk	4-4½x5½	Eise.	.....	Wauk.	Zenith	Own	Own	worm	Shel.	Ross
Gramm-B., W	3½	4,000	36x5	40x5d	Wauk.	4-4½x5½	Eise.	.....	Wauk.	Zenith	Own	Own	worm	Shel.	Ross
Gramm-B., W	5	5,000	36x6	40x6d	Wauk.	4-4½x6½	Eise.	.....	Wauk.	Zenith	Own	Own	worm	Shel.	Ross
Grant, 12	¾	1,125	32x4*	32x4*	H-S.	4-3½x5	Dixie	Bijur*	none	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Ditw.
Grant, 10	1½	1,885	34x4½	34x5	Cont.	4-3½x5	Dixie	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Grant, 11	1½	1,935	34x4½	34x5	Cont.	4-3½x5	Dixie	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Grant, 15	2	2,150	34x4	34x6	Cont.	4-3½x5	Dixie	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Grant, 16	2	2,250	34x4	34x6	Cont.	4-3½x5	Dixie	Remy*	Pierce	Car.*	B.&B.	G-Lees	in-g.	Torbn.	Jacx.
Hahn, G	1	1,375	34x3	34x4	Cont.	4-3½x5	Eise.	.....	.....	Strom.	Det.	Det.	in-g.	Torbn.	Lavn.
Hahn, C	1½	1,950	36x3½	36x5	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Hahn, E	2½	2,500	36x4	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Hall	2	2,675	36x4	36x4d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	3½	3,500	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	5	4,500	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Hall	7	4,500	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Harvey, WEA	1½	2,250	34x3½	34x5	Buda	4-4¼x5½	Bosch	none	Mon.	Zenith	Fuller	Fuller	chain	Timkn.	Gem.
Harvey, WFA	2½	3,000	36x4	36x7	Buda	4-4¼x5½	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey, WHA	3½	3,900	36x5	36x5d	Buda	4-4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey, WKA	5	5,000	36x6	40x6d	Buda	4-4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Harvey Trac., HT	10	4,000	36x5	36x5d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Shel.	Ross
Hawkeye, K	1½	1,900	34x3½	34x5	Buda	4-3¾x5½	Eise.	Vesta	Simplx	Zenith	Fuller	Fuller	in-g.	Clark	Gem.
Hawkeye, M	2	2,650	36x4	36x6	Buda	4-4½x5½	Eise.	Vesta	Simplx	Zenith	Fuller	Fuller	in-g.	Clark	Gem.
Hendrickson	2	2,850	36x4	36x4d	Wauk	4-4½x5½	Dixie	.....	Wauk.	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Hendrickson	3½	3,600	36x5	36x5d	Wauk	4-4½x5½	Dixie	.....	Wauk.	Strom.	B.&B.	Cotta.	worm	Timkn.	Ross
Higrade, A17	¾	1,850	35x5*	35x5*	Cont.	4-3½x5	Simms	L-N.*	Simplx	Zenith	Fuller	Fuller	worm	Shel.	Lavn.
Higrade, A18	1	2,100	35x5*	35x5*	Cont.	4-3½x5	Simms	L-N.*	Simplx	Zenith	Fuller	Fuller	worm	Shel.	Lavn.
Hoover, 15-B	1	1,435	32x4*	33x4½*	Cont.	4-3½x5	Spit.	none	.....	Scheb.	Fuller	Fuller	worm	Shel.	Lavn.
Huffman, C	1	1,495	34x3½	34x3½	Cont.	4-3½x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Shel.	Lavn.
Huffman, B	2½	1,695	34x5	34x5	Cont.	4-3½x5	Dixie	.....	.....	Zenith	Fuller	Fuller	worm	Torbn.	Lavn.
Hupmobile	¾	1,350	33x4*	33x4*	Own	4-3½x5½	A-K.	West.	.....	Strom.	Own	Own	s-bev.	Own	Jacx.
Hurlburt	2	3,500	36x4	36x4d	Buda	4-4½x5½	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	.....
Hurlburt	3½	4,250	36x5	36x5d	Buda	4-4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	.....
Hurlburt	5	5,250	36x5	40x6d	Buda	4-4½x6	Eise.	Vesta	Duplx.	Flech.	B-Lipe	B-Lipe	worm	Own	.....

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Beav., Beaver. **Ignition**—Eise., Eisemann A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece-Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles, Ruggles. **Carbureter**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter, Flech. Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe, Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W.G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms. W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chego., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Make of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carbureter	Clutch	Gearset	Final Drive	Axle	Steering Gear
Columbia, E	2	2,350	36x4	36x6	Cont.	4-4¼x5½	Split.	Vesta	Pierce	Shake.	Hart	Covert	in-g.	Russel	Own
Columbia, T	6	2,350	36x4	36x6	Cont.	4-4½x5½	Split.	Vesta	Pierce	Shake.	Hart	Covert	in-g.	Russel	Own
Comet	1½	1,750	34x4	34x4	Lyc.	4-3½x5	Delco	Dneto.	.....	Carter	B.&B.	Muncie	worm	Chgo.	CAS.
Commerce, E	1	1,500	34x3	34x4	Cont	4-3½x5	Split.	Bijur*	none	Zenith*	Det.	Det.	in-g.	Torbn.	Jacx.
Commerce, EP	2	1,895	36x6	36x6	Cont.	4-3½x5	Split.	Bijur*	none	Zenith*	Det.	Det.	in-g.	Torbn.	Own
Concord, A	1½	2,550	36x3½	36x5	Buda	4-3½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Concord, B	2½	3,000	36x4	36x4d	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Corbitt, E	1	2,000	34x3½	34x4	Cont.	4-3½x5	Eise.	Disco*	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Lavn
Corbitt, D	1½	2,400	36x3½	36x5	Cont.	4-3½x5	Eise.	Disco*	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Corbitt, C	2	3,000	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B Lipe	worm	Shel.	Ross
Corbitt, B	2½	3,200	36x4	36x7	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Corbitt, A	3½	4,000	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	H-Shaw	Cotta	worm	Sncl.	Ross
Corbitt, AA	5	4,500	36x6	40x6d	Cont.	4-4½x6	Eise.	none	Pierce	Strom.	H-Snaw	Cotta	worm	Shel.	Ross
Corliss, A	½	800*	31x4*	31x4*	Mil.	4-3½x4½	Split.	.....	.....	Scheb.	.....	.....	bevel	.....	.....
Couple-Gear, HO	3½	6,000	36x4d	36x4d	Cont.	4-4½x6	Eise.	. . . .	. . . .	Strom.	.....	.....	bevel	Own	Own
Couple-Gear, AO	5	6,600	36x5d	36x5d	Wis.	4-5½x7	Eise.	.....	.....	Strom.	.....	.....	bevel	Own	Own
Croce. 17	½	825	32x4*	32x4	Wis.	4-3½x5	Bosch	.....	.....	Zenith	B-Lipe	B-Lipe	bevel	Timkn.	Lavn.
Dart, E	1	2,100	34x3½	34x5	Dart	4-3½x5½	Eise.	Bijur*	none	Zenith*	Fuller	Fuller	worm	Timkn	Ross
Dart, CC4	2	2,950	36x4	36x7	Buda	4-4½x5½	Eise.	Bijur*	Pierce	Zenith	Fuller	Fuller	worm	Timkn.	Ross
Dart, L	3½	4,000	30x5	36x10	Buda	4-4½x6	Eise.	Bijur*	Pierce	Zenith	WG Co.	WG Co.	worm	Timkn	Ross
D-E, J	½	1,050	33x4*	LeR	4-3½x4½	Berl.	Al-Ch*	.....	Scheb.	Det.	Det.	worm	Shel.	Gem.	
D-E A	1	1,775	34x3	34x4	Cont.	4-3½x5	Berl.	.....	.....	Zenith	B.&B.	Covert	worm	Wis.	Ross
D-E, B	1½	2,075	34x2½	34x5	Cont.	4-3½x5	Berl.	.....	.....	Zenith	B.&B.	Covert	worm	Wis.	Ross
D-E, D	2	2,450	36x4	36x6	Cont.	4-4½x5½	Berl.	.....	.....	Zenith	B.&B.	Covert	worm	Wis.	Ross
D-E, C	2½	2,750	36x4	36x7	Buda	4-4¼x5½	Berl.	.....	Mon.	Zenith	B.&B.	Covert	worm	Wis,	Ross
D-E, E	5	4,500	36x5	40x6d	Buda	4-4½x6	Berl.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
D-E, F	3½	3,350	36x5	36x5d	Cont.	4-4½x5	Berl.	.....	Mon.	Zenith	B-Lipe	B-Lipe	worm	Wis.	Ross
Defiance, B	1½	1,795	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Strom.	B.&B.	G-Lees	in-g.	Torbn.	Own
Defiance, C	2	1,995	34x3½	34x6	Cont,	4-4½x5	Eise.	.....	Mon.	Strom.	B.&B.	G-L es	in-g.	Torbn.	Own
Defiance, D	3½	3,500	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Strom.	B.&B.	Covert	in-g.	Torbn.	Wol.
DeKalb, E-2	2	2,100	34x3½	30x5	Cont.	4-4½x5½	Eise.	none	none	Master	Fuller	Covert	worm	Timkn.	Ross
DeKalb, E-2½	2½	2,600	36x4	36x6	Cont.	4-4½x5½	Eise.	none	none	Master	Fuller	Fuller	worm	Timkn.	Ross
Denby, 12	1	1,650	34x3	34x4	Cont.	4-3½x5	Eise.	Bijur*	Mon.	Strom.	Det.	Det.	in-g.	Russel	Ross
Denby, 13	2	2,350	36x3½	36x6	Cont.	4-3½x5	Eise.	Bijur*	Mon.	Strom.	Det.	Det.	in-g.	Russel	Gem
Denby, 25	3	3,000	36x4	36x7	Cont.	4-4¼x5½	Eise.	Bijur*	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem
Denby, 27	3½	4,150	36x5	36x10	Cont.	4-4¼x5½	Eise.	.....	Duplx.	Strom.	Own	Warner	in-g.	Clark	Ross
Denby, 210	5	4,900	36x6	40x12	Cont.	4-4½x5½	Eise.	.....	Duplx.	Strom.	Own	WG Co.	in-g.	Clark	Ross
Diamond-T, J5	1	2,125	36x3	36x4	Cont.	4-3½x5	Bosch	none	Pierce	Strom.	B-Lipe	B Lipe	worm	Timkn.	Gem.
Diamond-T, J4	1½	2,550	36x3½	36x5	Cont.	4-3½x5	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Diamond-T, J3	2	2,925	36x4	36x7	Cont.	4-4¼x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Diamond-T, LB	3	4,150	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Diamond-T, R	5½	4,950	36x6	40x6d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Doane	2½	3,500	36x4	36x7	Wauk.	4-4¼x5½	Bosch	.....	.....	Master	B-Lipe	B-Lipe	chain	Own	Lavn.
Doane	6	5,650	36x6	40x6d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Master	B-Lipe	.....	chain	Own	Lavn.
Dorris, K4	2	2,985	36x4	36x7	Own	4-4½x5½	Bosch	West.*	Own	Strom.	WG Co.	WG Co.	worm	Timkn.	Ross
Douglas, TA	1	2,000	34x3½	34x5	Buda	4-4½x5	Eise.	A-L	Pierce	Scheb.*	B.&B.	G-Lees	in-g.	Torbn.	Ross
Duplex, E	3½	4,000	36x6	36x6	Buda	4-4½x5½	Eise.	opt.	Duplx.	Sneb.*	B-Lipe	B-Lipe	in-g.	Own	Lavn.
Ellsworth, 25A	½	855*	30x3½*	30x3½*	Lyc.	4-3½x5	.....	Dneto.*	none	Carter	Mech.	Meeb.	bevel	Gemco	Fost.
Fageol	2	3,300	34x4	36x7	Wauk.	4-4 x5½	Dixie	.....	Wauk.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Fargo, P	2	2,200	36x4	36x6	Cont.	4-3½x5	Bosch	none	Mon.	Ray.	Fuller	Fuller	in-g	Russel	Jacx.
Federal, S	1	1,900	34x3	34x4	Cont.	4-3½x5	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, T	1	2,350	36x3½	36x5	Cont.	4-4½x5½	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, U	2½	2,600	36x4	36x7	Cont.	4-4½x5½	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, Trac	3	2,500	36x3½	36x5	Cont.	4-4¼x5½	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, W	3½	3,350	36x5	36x5d	Cont.	4-4½x5½	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Federal, X	5	4,400	36x6	40x6d	Cont.	4-4½x5½	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem
Federal, Trac	7	3,475	36x5	36x5d	Cont.	4-4½x5½	Eise.	opt.	Mon.	Zenith	B.&B.	Own	worm	Timkn.	Gem.
Forschler	¾	1,535	32x2½	32x3	LeR.	4-3½x4½	Dixie	.....	Mon.	Zenith	Det.	.....	worm	Shel.	Ross
Forschler	1	2,000	34x3	34x4	Cont.	4-3½x5	Bosch	.....	Mon.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	1½	2,375	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Mon.	Zenith	Fuller	Fuller	worm	Shel.	Ross
Forschler	2	2,750	34x4	34x6	Contl	4-4½x5½	Bosch	.....	Pierce	Zenith	Fuller	Fuller	worm	Shel.	Ross
Ford, TT	1	550	30x3½*	32x3½	Own	4-3½x4	Own	.....	.....	Own	Own	Own	worm	Own	Own
F.W.D., R	3	4,500	36x6	36x6	Wis.	4-4½x5½	Eise.	.....	Pierce	Strom.	M&E	Cotta	bevel	Own	Ross
Fulton, FX	1½	1,850	34x3½	34x5	H-S	4-3⅜x5 1/16	Simms	.....	Pierce	Carter	B.&B.	Own	in-g.	Russel	Lavn.
Gabriel,* C	1	2,000	35x5*	35x5*	Buda	4-3½x5	Bosch	L-N*	none	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Gabriel, E	2	3,250	36x4	36x7	Buda	4-4¼x5½	Bosch	L-N*	Duplx.	Ray.	B.&B.	B-Lipe	worm	Timkn.	Gem.
I. H. C., H	¾	1,550	36x3	36x3½	Own	4-3½x5½	Bosch	N-E.*	Own	Holl.	Own	Own	in-g.	Own	Lavn.
I. H. C., F	1	1,850	36x3½	36x4	Own	4-3½x5½	Bosch	N-E.*	Own	Holl.	Own	Own	in-g.	Own	Lavn.
I. H. C., K	1½	2,200	36x3½	36x5	Own	4-3½x5¼	Bosch	N-E.*	Own	Holl.	Own	Own	in-g.	Own	Ross
I. H. C., G	2	2,600	36x4	36x6	Own	4-4 x5	Split.	N-E.*	Own	Ens.*	Own	Own	in-g.	Own	Ross
Independent, F	1	1,485	36x2	36x4	Cont.	4-3½x5	Eise.	Lesco.	Mon.	Marvel	B-Lipe	B-Lipe	worm	Chgo.	Lavn.
Independent, G	2	2,250	36x3½	36x5	Cont.	4-4½x5½	Eise.	none	Mon.	Marvel	.....	.....	worm	.....	.....
Indiana, T	1	2,150	34x3½	34x4	Wauk.	4-3½x5½	Eise.	West.*	Wauk.	Strom.	B.&B.	Covert	worm	Own	Wol.
Indiana, Q	1½	2,600	36x3½	36x5	Ruten	4-4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana, D	2	2,800	36x4	36x7	Ruten	4-4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana, R	3½	3,450	36x5	36x5d	Ruten	4-4½x5½	Eise.	West.	Pierce	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Indiana, L	5	4,600	36x5	40x6d	Wauk.	4-4½x6½	Eise.	West.	Wauk.	Strom.	B.&B.	B-Lipe	worm	Shel.	Wol.
Jumbo, A	2	.....	36x4	36x7	Buda	4-4½x5½	Eise.	none	Duplx.	Zenith	Fuller	Fuller	in-g.	Clark	Jacx.
Kearns	½	850	30x3½*	30x3½*	Lyc.	4-3½x5	Conn.	Dneto.*	none	Carter	Mech.	Mech.	bevel	Peru	Lavn.
Kearns	1½	1,800	34x3½	34x5	H-S.	4-3½x5	Berl.	none	none	.....	B.&B.	G-Lees	.....	Hayes	.....
Kelly-S., K-31	1½	2,750	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Own	Zenith	Own	Cover	chain	Own	Gem.
Kelly-S., K-32	1½	2,750	36x3½	36x6	Own	4-3½x5½	Eise.	opt.*	Own	Zenith	Own	Cover	worm	Own	Gem.
Kelly-S., K-35	2½	3,250	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Own	Zenith	Own	Cover	chain	Own	Gem.
Kelly-S., K-36	2½	3,250	36x4	36x4d	Own	4-3½x5½	Eise.	opt.*	Own	Zenith	Own	Cover	worm	Own	Gem.
Kelly-S., K-40	3½	4,250	36x5	40x5d	Own	4-4½x6½	Eise.	opt.*	Own	Ray.	Own	Cover	chain	Own	Gem.
Kelly-S., K-45	4	4,400	36x5	40x6d	Own	4-4½x6½	Eise.	opt.*	Own	Ray.	Own	Cover	chain	Own	Gem.
Kelly-S K-50	5	4,900	36x6	40x6d	Own	4-4½x6½	Eise.	opt.*	Own	Ray.	Own	Cover	chain	Own	Gem.
Kelly-S., K-60	6	5,200	36x6	40x7d	Own	4-4½x6½	Eise.	opt.*	Own	Ray.	Own	Cover	chain	Own	Gem.
Kimball, 2A	1½	.....	36x3½	36x5	Wis.	4-4 x5	Eise.	.....	Simplx	Mast.*	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Kimball, 4A	2	.....	36x4	36x6	Wis.	4-4 x6	Eise.	.....	Simplx	Mast.*	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Kimball, 6A	2½	.....	36x4	36x7	Wis.	4-4½x6	Eise.	.....	Simplx	Mast.*	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Kimball, 8A	4	.....	36x5	40x5d	Wis.	4-4½x5½	Eise.	.....	Simplx	Mast.*	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Kimball, 10A	5	.....	36x6	40x6d	Wis.	4-5 1x5½	Eise.	.....	Simplx	Mast.*	B-Lipe	B-Lipe	worm	Shel.	Lavn.
Kissel	1½	2,073	34x3½	34x5	Own	4-3½x5½	Eise.	*	Pierce	Strom.	WG Co.	WG Co.	worm	Shel,	Jacx.
Kissel	2	2,832	34x4	36x7	Own	4-4½x5½	Eise.	*	Pierce	Strom.	WG Co.	WG Co.	worm	Timkn.	Lavn.
Kissel	3½	3,905	36x5	36x5d	Own	4-4½x5½	Eise.	*	Pierce	Strom.	WG Co.	WG Co.	worm	Shel.	Ross
Kissel	5	4,785	36x6	36x6d	Own	4-4½x5½	Eise.	*	Pierce	Strom.	WG Co.	WG Co.	worm	Shel.	Ross
Kleiber, AA	1	2,400	34x3½	34x5	Cont.	4-3½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Kleiber, A	1½	2,650	36x3½	36x6	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, BB	2	2,950	36x4	36x3½d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Kleiber, B	2½	3,500	36x4	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Shel.	Ross
Kleiber, C	3½	4,100	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Kleiber, D	5	5,100	36x6	40x6d	Cont	4-5½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	B-Lipe	worm	Timkn.	Ross
Knox, 35	10	5,500	36x4	38x6d	Own	4-5 x5½	Eise.	Bijur.*	none	Zenith*	Own	Own	chain	Timkn.	Ross
Knox, 36	10	6,000	36x4	38x6d	Own	4-5 x5½	Eise.	Bijur.*	none	Zenith*	Own	Own	chain	Timkn.	Ross
Koehler, K	1½	1,450	34x3	34x4	Own	4-3½x5	Eise.	none	Mon.	Strom.	Mech.	Mech	in-g.	Torbn.	Own
Koehler, L	2½	1,985	34x4	34x6	Own	4-3½x5	Eise.	none	Mon.	Strom.	Mech.	Mech.	in-g.	Torbn.	Own
Koehler, M	2½	2,965	36x4	36x7	Own	4-4x5	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Own
Koehler Trac., KT	3	1,750	34x3	34x5	Own	4-3½x5	Eise.	none	Mon.	Strom.	Mech.	Mech.	in-g.	Torbn.	Own
Koehler, O	3½	3,400	36x5	36x5d	Own	4-4½x5	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Own
Koehler Trac., LT	5	2,165	34x4	34x6	Own	4-3½x5	Eise.	none	Mon.	Strom.	Mech.	Mech.	in-g.	Torbn.	Own
Koehler, R	5	4,200	36x6	36x6	Own	4-5x6	Eise.	none	Simplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Own
LaFrance, 2-A	2	3,350	36x4	36x7	Cont.	4-4½x5½	Conn.	Dneto.*	Simplx	Zenith	B.&B.	B-Lipe	worm	Timkn.	Ross
Lane, G	1½	2,350	34x4	35x5	Cont.	4-3½x5	Conn	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	.....	Ross
Lane, H	2½	3,050	34x5	36x7	Cont.	6-3½x5½	Bosch	Dneto.	Pierce	Strom.	B.&B.	Fuller	worm	Timkn.	Ross
Lane, K	3½	3,900	36x5	36x5d	Cont.	6-3½x5½	Bosch	Dneto.	Pierce	Strom.	Fuller	Fuller	worm	Shel.	Ross
Lange, B	2	2,950	36x4	36x6	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	H-Shaw	Own	chain	Own	Gem.
Lapeer Trac., 3	3	1,650	34x3½	34x5	Wauk	4-3½x5½	Dixie	.....	Wauk.	Stew.	Fuller	Fuller	in-g.	Torbn.	Ross
Lapeer Trac., 5	5	2,200	34x3½	34x3½d	Wauk.	4-3½x5½	Dixie	.....	Wauk.	Stew.	Fuller	Fuller	in-g.	Torbn.	Ross
Larrabee, M	1	1,950	34x3½	34x5	Cont.	4-3½x5	Bosch	.....	Pierce	Scheb.	Fuller	Fuller	worm	Shel.	Lavn.
Larrabee, C-D	2½	3,000	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, A	3½	3,950	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Larrabee, T	5	4,750	36x5	40x6d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Lippard-St., C	¾	1,900	35x4½*	35x4½*	Cont.	4-3½x5½	Eise.	Dneto.*	Pierce	Zenith	Hart	B-Lipe	s-bev.	Timkn.	Ross
Lippard-St., H	1	2,250	36x3	36x5	Cont.	4-3½x5½	Eise.	Dneto.*	Pierce	Zenith	Hart	B-Lipe	worm	Timkn.	Ross
Lippard-St., F	1½	2,750	36x3½	36x3d	Cont.	4-4¼x5½	Eise.	Dneto.*	Pierce	Zenith	Hart	B-Lipe	worm	Timkn.	Ross
Lippard-St., G	2	3,050	36x4	36x4d	Cont.	4-4½x5½	Eise.	Dneto.*	Pierce	Zenith	Hart	B-Lipe	worm	Timkn.	Ross
Lombard, 5	.....	.....	.....	.....	.....	6-5½x7	.....	.....	.....	Strom.	.....	.....	worm	.....	.....
Loyal	½	835	32x4*	32x4*	H-S.	4-3½x5	A-K.	•	.....	Strom.	B.&B.	Cover	in-g.	Torbn.	.....
Loyal	¾	950	32x4*	32x4*	H-S.	4-3½x5	A-K.	•	.....	Strom.	B.&B.	Cover	in-g.	Torbn.	.....
Maccar, L	1½	2,750	36x4	36x5	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross

Abbreviations: Engine—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Beav., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nhte, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece-Neville; Det., Detroit; N-E, North East. Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental: Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles, Ruggles. **Carbureter**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King. Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe, Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms. W .G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn. ,Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Motor Age Monthly Motor Truck Specifications—Concluded

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Make of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carbureter	Clutch	Gearset	Final Drive	Axle	Steering Gear
Maccar, H	2½	3,300	36x4	36x4d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, M	3½	4,100	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Maccar, U	5½	5,000	36x5	40x6d	Wis.	4-5 .1x5½	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack, AB	1	2,400	36x4	36x3½d	Own	4-4 x5	Split.	opt.	Own	Strom.	B-Lipe	B-Lipe	chain	Own	Gem.
Mack, AB	1	2,400	36x4	36x3½d	Own	4-4 x5	Split.	opt.	Own	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack, AB	1½	2,800	36x4	36x3½d	Own	4-4 x5	Split.	opt.	Own	Strom.	B-Lipe	B-Lipe	chain	Timkn.	Gem.
Mack, AB	1½	2,800	36x4	36x3½d	Own	4-4 x5	Split.	opt.	Own	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Mack, AB	2	3,000	36x4	36x4d	Own	4-4 x5	Split.	opt.	Own	Strom.	B-Lipe	B-Lipe	chain	Own	Gem.
Mack, AB	2	3,000	36x4	36x4d	Own	4-4 x5	Split.	opt.	Own	Strom.	B-Lipe	B-Lipe	chain	.....	Gem.
Mack, AB	5	.....	36x4	36x4d	Own	4-4 x5	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Mack, AC	3½	4,600	36x5	40x5d	Own	4-5 x6	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Mack, AC	5½	5,250	36x6	40x6d	Own	4-5 x6	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Mack Trac., AC	7	4,600	36x5	40x5d	Own	4-5 x6	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Mack, AC	7½	5,500	36x7	40x7d	Own	4-5 x6	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Mack Trac., AC	11	5,250	36x6	40x6d	Own	4-5 x6	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Mack Trac., AC	15	5,500	36x7	40x7d	Own	4-5 x6	Split.	opt.	Own	Strom.	Own	Own	chain	Own	Gem.
Manly, 30	1½	2,050	36x4	36x5	Wauk.	4-3½x5½	Fise.	.....	Wauk.	Zenith*	.....	.....	worm	.....	.....
Manly, 40	2	2,350	36x4	36x6	Wauk.	4-3½x5½	Fise.	.....	Wauk.	Zenith*	.....	.....	worm	.....	.....
Manly, 50	2½	2,800	36x4	40x7	Wauk.	4-4 x5½	Fise.	.....	Wauk.	Zenith*	.....	.....	worm	.....	.....
Master, JI	1½	1,890	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	.....	Fuller	Fuller	in-g.	Torbn.	Wol.
Master, JW	1½	1,890	34x3½	34x5	Buda	4-4½x5½	Eise.	opt.	McCan.	.....	Fuller	Fuller	worm	Timkn.	Wol.
Master, M	2	2,390	34x4	36x7	Buda	4-4½x5½	Fise.	West.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Torbn.	Wol.
Master, O	2	2,490	34x4	36x7	Buda	4-4½x5½	Eise.	opt.	McCan.	Mast.	B-Lipe	B-Lipe	in-g.	Timkn.	Wol.
Master, W	2	2,590	34x4	36x7	Buda	4-4½x5½	Eise.	West.*	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Wol.
Master, WL	2	2,690	34x4	36x7	Buda	4-4½x5½	Eise.	West.*	McCan.	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Master, A	3½	3,890	36x5	40x5d	Buda	4-4½x6	Eise.	West.	Pierce	Mast.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Master, B	5	4,890	36x6	40x6d	Buda	4-4½c6	Eise.	.....	Pierce	Mast.	B-Lipe	B-Lipe	worm	.....	.....
Maxfer	1	1,195	36x4*	34x4	.....	4-3½x5	Delco	Delco*	.....	.....	.....	.....	worm	Own	Own
Maxwell	1	1,085	32x3	32x4	Own	4-3½x4½	A-K.	A-L.	Own	John.	Own	Own	worm	Own	Own
Menominee	1	1,890	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Timkn.	Gem.
Menominee, H	1½	2,475	36x3½	36x5	Cont.	4-3½x5½	Eise.	.....	Mon.	.....	Fuller	Fuller	worm	Timkn.	Gem.
Menominee, D	2	2,950	36x4	36x4d	Cont.	4-4½x5½	Eise.	.....	Mon.	.....	Fuller	Fuller	worm	Timkn.	Gem.
Menominee, G	3½	3,880	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Mon.	Strom.	Fuller	Fuller	worm	Timkn.	Gem.
Menominee, J	5	4,950	36x6	40x6d	Cont.	4-4½x5½	Eise.	.....	Mon.	.....	B-Lipe	B-Lipe	worm	Timkn.	Ross.
Modern, 30	.....	1,800	34x3½	34x5	Cont.	4-3½x5	.....	.....	opt.	Zenith	Fuller	Fuller	worm	Timkn.	Ross.
Moreland, 17-N	1	2,175	34x3½	34x4	Cont.	4-3½x5	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 17-B	1½	2,930	36x3½	36x5	Cont.	4-4½x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 17-C	2½	3,775	36x4	36x7	Cont.	4-4½x5½	Dixie	.....	.....	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 17-G	4	4,850	36x5	40x5d	Wauk.	4-4½x6½	Dixie	.....	Wauk.	Miller	Own	Own	worm	Timkn.	Ross
Moreland, 17-J	5	5,250	36x6	40x6d	Wauk.	4-4½x6½	Dixie	.....	Wauk.	Miller	Own	Own	worm	Timkn.	Ross
Muskegon, 20	2	2,325	36x4	36x6	Cont.	4-4½x5½	Eise.	none	Pierce	Stew.	Fuller	Fuller	in-g.	Torbn.	Lavn.
Mutual	2	.....	36x4	36x4d	Wis.	4-4½x6	Bosch	Vesta	Duplx.	Strom.	H-Shaw	Fuller	worm	Wis.	Ross
Mutual	3½	.....	36x5	40x5d	Wis.	4-4½x5½	Bosch	Vesta	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Mutual	5	.....	36x6	40x6d	Wis.	5.1x5½	Bosch	Vesta	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Mutual	5	.....	36x6	40x6d	Wis.	5.1x5½	Bosch	Vesta	Duplx.	Strom.	H-Shaw	Warner	worm	Wis.	Ross
Myers, 50	1	1,495	34x4	34x4	Lyc.	4-3½x5	Delco	Dneto.	Pierce	Car.*	Mech.	Mech.	worm	Emp.	C.A.S
Myers, 55	1	1,460	34x3½	34x4	Lyc.	4-3½x5	Delco	.....	Pierce	Car.*	Mech.	Mech.	worm	Emp.	C.A.S
Myers, 70	1½	1,750	34x3½	34x5	Lyc.	4-3½x5	Delco	Dneto.*	Pierce	Car.*	B.&B.	G-Lees	worm	Emp.	C.A.S.
Myers, 75	1½	1,700	34x3½	34x5	Lyc.	4-3½x5	Delco	Dneto.*	Pierce	Car.*	B.&B.	G-Lees	worm	Emp.	C.A.S.
Nash, 2018	1	1,650	34x3	34x4	Own	4-3½x5½	Conn.	A-L.*	Duplx.	Strom.	B.&B.	Det.	in-g.	Clark	Jacox.
Nash, 4017	2	3,250	36x5	36x5	Buda	4-4½x5½	Eise.	Bijur*	Duplx.	Strom.	B.&B.	Own	in-g.	Own	Lavn.
Nash, 3018	2	2,175	34x4	36x5	Own	4-3½x5½	Conn.	A-L.*	Duplx.	Strom.	B.&B.	Det.	in-g.	Clark	Jacox.
Nelson & LeM., F	1	2,000	36x3	36x4	Cont.	4-3½x5½	Eise.	West.*	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson & LeM., F2	2	2,775	36x4	36x7	Cont.	4-4½x5½	Eise.	West.*	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson & LeM., F	3½	3,750	36x5	36x5d	Cont.	4-4½x5½	Eise.	West.*	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Nelson & LeM	5	4,750	36x6	40x6d	Buda	4-4½x6	Eise.	none	.....	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Netco, D	2	3,000	36x4	36x6	Cont.	4-4½x5¼	Eise.	.....	Pierce	Strom.	Cover	Cover	worm	Timkn.	Gem.
Niles, B	1	1,500	35x5*	35x5*	Cont.	4-3½x5	Eise.	.....	Pierce	Strom.	B.&B.	Cover	worm	Timkn.	Gem.
Niles, E	2	2,400	36x4	36x7	Cont.	4-4½x5½	Eise.	.....	Pierce	Strom.	B.&B.	Fuller	worm	Shel.	Ross
Noble, NW2	2½	2,675	36x4	3ox7	Cont.	4-4½x5½	Eise.	Remy.	Pierce	Strom.	B.&B.	Fuller	worm	Shel.	Ross
Noble, NW4	4	3,750	36x5	36x5d	Cont.	4-4½x5½	Eise.	Remy.	Pierce	Strom.	B.&B.	Fuller	worm	Emp.	C.A.S.
Norwalk, 2000	1	.....	34x4*	34x4*	Lyc.	4-3½x5	Delco	Dneto.*	none	Car.*	B.&B.	G-Lees	worm	Stand.	C.A.S.
Norwalk, 3000	1½	.....	34x4	34x5	Lyc.	4-3½x5	Delco	Dneto.*	none	Car.*	B.&B.	G-Lees	worm	Timkn	Gem.
Ogden	1	.....	36x3	36x4	Cont.	4-3½x5	Bosch	.....	Pierce	Ray.	.....	B-Lipe	worm	Chgo.	Ross
O. K., 1½T	1½	2,450	36x4	36x5	Buda	4-4¼x5½	Eise.	none	Pierce	Zenith	Muncie	Muncie	worm	Chgo.	Ross

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Make of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carbureter	Clutch	Gearset	Final Drive	Axle	Steering Gear
Royal	5	5,000	36x6	40x6d	Wis.	4-4½x5½	Bosch	opt.*	Mon.	Strom.	H-Shaw	Own	worm	Timkn.	Ross
Royal	6	5,400	36x6	40x6d	Wis.	4-5½x6	Bosch	opt.*	Mon.	Strom.	H-Shaw	Own	worm	Timkn.	Ross
Royal	7	6,500	36x7	40x7d	Wis.	4-5½x7	Bosch	opt.*	Mon.	Strom.	H-Shaw	Own	worm	Timkn.	Ross
Rush, D	½	895	31x4	31x4	Cont.	4-3½x5	Conn.	Split.*	.....	Carter	B.&B.	.....	bevel	Own	Lavn.
Sandow, G	1	1,795	34x3	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, CG	1½	2,090	34x3	34x5	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Shel.	Ross
Sandow, H	1½	2,375	34x4	34x6	Cont.	4-3½x5	Eise.	.....	.....	Strom.*	Fuller	Fuller	worm	Timkn.	Ross
Sandow, J	2	2,975	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow	2	2,650	36x4	36x6	Cont.	4-3½x5	Eise.	.....	.....	Strom.	Fuller	Fuller	worm	Shel.	Ross
Sandow, K	3½	3,995	36x5	36x5d	Cont.	4-4½x5	Bosch	.....	Mon.	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sandow, L	5	4,775	36x6	40x6d	Cont.	4-4½x6	Bosch	.....	Cont.	St.om.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Sanford, 25	2½	3,000	36x4	3ox4d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B.&B.	Det.	worm	Shel.	Ross
Sanford, 35	3½	3,975	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B.&B.	WG Co.	worm	Shel.	Ross
Sanford, 50	5	4,750	36x5	36x6d	Cont.	4-4½x5½	Bosch	none	Pierce	Strom.	B.&B.	WG Co.	worm	Shel.	Ross
Schacht	2	3,150	36x4	36x7	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart	Own	worm	Own	Own
Schacht	2½	3,500	36x4	36x4d	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart	Own	worm	Own	Own
Schacht	3½	3,950	36x5	36x5d	Buda	4-4½x5½	Bosch	none	Duplx.	Scheb.	Hart	Own	worm	Own	Own
Schacht	5	4,950	36x5	40x6d	Buda	4-4½x5½	Bosch	.....	opt.	Strom.	.....	Own	chain	Own	.....
Schleicher	3	3,675	34x-½	34x3½d	Cont.	4-4½x5½	Bosch	.....	.....	Strom.	.....	Own	chain	Own	.....
Schleicher	5	4,725	34x5	34x4d	Cont.	4-5 x6	Bosch	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	in-g.	Russel	Lavn.
Selden, TXR	1	2,000	34x3½	34x5	Cont.	4-3½x5	Bosch	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Selden, TWL	1	2,200	34x3	34x4	Cont.	4-3½x5	Bosch	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	in-g.	Russel	Lavn
Selden, TXL	1	1,650	34x3½	34x5	Cont.	4-3½x5	Bosch	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	in-g.	Russel	Jacx.
Selden, JCB	2	2,850	36x4	36x7	Cont.	4-4½x5½	Bosch	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Selden, JWB	2	3,050	36x4	36x7	Cont.	4-4½x5½	Bosch	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Selden, NL	3½	3,850	36x5	36x5d	Cont.	4-4½x5½	Eise.	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Selden, DL	5	5,000	36x6	40x12	Cont.	4-4½x5½	Eise.	N-E*	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Seneca, J	½	.....	.....	30x3½*	30x3½*	LeR.	4-3½x4½	Remy	A -Ch.*	none	Scheb.*	Det.	bevel	Adams	Ditw.
Service, 320	1	2,100	32x3½	34x5	Buda	4-3½x5½	Eise.	West.	none	Strom.*	Fuller	Fuller	worm	Timkn.	Ross
Service, 340	2	3,000	36x4	3ox7	Buda	4-4½x5½	Eise.	West.	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 370	3½	3,900	36x5	36x5d	Buda	4-4½x5½	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 375	3½	4,200	36x5	36x5d	Buda	4-4½x6	Eise.	West.*	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Ross
Service, 400	5	5,000	36x6	40xtd	Buda	4-4½x6	Eise.	.....	Duplx.	Strom.	B.&B.	B-Lipe	worm	Timkn.	Gem.
Shaw, M-3	5	5,000	36x6	40x6d	Cont.	4-4½x5½	Bosch	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signa , F	1	2,700	36x4	36x6	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signa , H	1½	2,400	34x3½	36x5	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signa , J	2	2,700	34x4	36x6	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signa , M	3½	3,100	34x4	36x8	Cont.	4-4½x5½	Eise.	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Signa , R	5	4,100	36x5	40x5d	Cont.	4-4½x5½	Eise.	none	.....	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 76	2	2,800	36x4	36x6	Cont.	4-4½x6	Eise.	none	Pierce	Scheb.	B-Lipe	B-Lipe	worm	Timkn.	Ross
Standard, 66	3½	3,675	36x5	36x5d	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.*	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Standard, 86	5	4,650	36x6	40x6d	Cont.	4-4½x5½	Eise.	none	Mon.	Strom.*	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Steele, C	2	2,500	38x5	40x4d	Cont.	4-4½x5½	Eise.	.....	Own	Strom.	H-Shaw	Cotta	chain	Own	Gem.
Steele, B	3	3,000	38x6	4Cxbd	Own	4-5 x5	Eise.	.....	Own	Strom.	H-Shaw	Cotta	chain	Own	Ross
Steele, BA	4	3,500	38x6	40x5d	Own	4-5 x5	Eise.	.....	Own	Strom.	H-Shaw	Cotta	chain	Own	Ross
Steele, A	5	4,000	38x7	40x6d	Own	4-5 x5	Eise.	.....	Own	Strom.	H-Shaw	Cotta	chain	Own	Ross
Sterling	2½	3,300	36x4	36x4d	Own	4-4½x5½	Eise.	.....	Wauk.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Sterling	3½	4,325	36x5	40x5d	Own	4-4½x6½	Eise.	.....	Wauk.	Ray.*	H-Shaw	Own	worm	Timkn.	Ross
Sterling	5	5,100	36x6	40x6d	Own	4-4½x6½	Eise.	.....	Wauk.	Ray.*	H-Shaw	Own	worm	Timkn.	Ross
Sterling	7	5,600	36x6	40x7d	Own	4-4½x6½	Eise.	.....	Wauk.	Ray.*	H-Shaw	Own	chain	Own	Ross
Stewart, 6	¾	950	33x4*	33x4*	LeR.	4-3½x4½	Eise.	.....	Le Roi	Zenith	Mech.	Mech.	in-g.	Clark	CAS
Stewart, 8	1	1,575	34x3½	34x4	Cont.	4-3½x5	Eise.	.....	Mon.	Zenith	B.&B.	Fuller	in-g.	Clark	Gem.
Stewart, 9	1½	1,975	34x3½	34x5	Cont.	4-3½x5	Eise.	.....	Mon.	Zenith	Fuller	Fuller	in-g.	Clark	Gem.
Stewart, 7	2	2,575	34x4	34x4d	Cont.	4-3½x5	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Stewart, 10	3½	3,500	36x5	36x5d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	Fuller	Fuller	in-g.	Clark	Ross
Sullivan, F	1½	2,350	36x3	36x5	Buda	4-4½x5½	Bosch	.....	.....	Strom.	Hart	Covert	worm	Timkn.	Ross
Sullivan, E	2	2,850	36x4	36x6	Buda	4-4½x5½	Bosch	.....	.....	Strom.*	B-Lipe	B-Lipe	worm	Timkn.	Ross
Superior, A	1	1,600	34x3½	34x4*	Own	4-3½x5	Eise.	none	Mon.	Strom.*	Fuller	Fuller	in-g.	Torbn.	CAS
Superior, C	2	2,200	36x4	36x6	Own	4-3½x5	Eise.	none	Mon.	Strom.*	Fuler	Fuller	in-g.	Torbn.	Ross
Texan	1½	1,375	34x4*	34x4	Lyc.	.....	.....	Dneto.*	.....	.....	.....	.....	.....	Muncie	worm
Tiffin, A	1¾	1,100	35x4½	35x4½*	Cont.	4-3½x5	Bosch	none	none	Scheb.	Det.	Det.	in-g.	Chego.	.....
Tiffin, GW	1½	2,125	36x3½	36x5	Cont.	4-3½x5½	Bosch	none	Pierce	Scheb.	Fuller	Fuller	worm	Russe	Lavn
Tiffin, MW	2½	2,850	36x4	36x3½d	Cont.	4-4½x5½	Bosch	none	Pierce	Scheb.	Hart	Covert	worm	Shel.	Ross
Tiffin, PW	3½	3,760	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.*	Pierce	Scheb.	B.&B.	Covert	worm	Shel.	Ross

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi, GBS, Golden, Belknap & Swartz; Beav., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece-Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric Starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch: Simplx., Simplex; McCan., McCanna; Rugles, Ruggles. **Carbureter**—Scheb., Schebler; Strom., Stromberg; Ray., Rayfield; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe, Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&F., Merchant & Evans; Lyc., Lycoming; W. G. Co., Wanaer Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms. W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear **Axle**—Tinkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chego., Chicago-Standard; Chgo., Chicago; W-W, Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Name of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carbureter	Clutch	Gearset	Final Drive	Axle	Steering Gear
O. K., 2T	2	2,650	36x4	36x5	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Muncie	Muncie	worm	Chgo.	Ross
O. K., 3T	3	3,250	36x4	36x7	Buda	4-4½x5½	Eise.	none	Pierce	Zenith	Fuller	Fuller	worm	Hays	Ross
Old Hickory, M		995	33x4*	33x4*	Lyc.	4-3½x5	Conn.	Dneto.*	.....	Car.	Lyc.	G-Lees	bevel	Salsby	C.A.S.
Old Rel'ble, W-15	1½	2,350	34x3½	36x6	Wis.	4-4 x5	Bosch	opt.	Mon.	Ray.*	B-Lipe	B-Lipe	worm	Shel.	Ross
Old Rel'ble, W-25	2½	3,250	36x4	36x4d	Wis.	4-4¼x6	Bosch	opt.	Mon.	Ray.	Fuller	Fuller	worm	Shel.	Ross
Old Rel'ble, W-35	3½	4,000	36x5	3ox5d	Wis.	4-4¼x5½	Bosch	opt.	Mon.	Ray.	Univ	Savg	worm	Shel.	Ross
Old Rel'ble, W-50	5	5,000	36x6	40x6d	Wis.	4-5.1x5½	Bosch	opt.	Duplx.	Strom.	Univ.	Savg.	worm	Shel.	Ross
Old Rel'ble, C-50	5	5,000	36x6	36x6d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Strom.	Univ.	Savg.	chain	Shel.	Ross
Old Rel'ble, C-70	7	6,000	36x6	40x7d	Wauk.	4-4½x6½	Bosch	none	Wauk.	Strom.	Univ.	Savg.	chain	Shel.	Ross
Oldsmobile	¾	1,250	35x5*	35x5*	Own	4-3 1/16x5½	A-L	A-L	Mon.	Zenith	.....	.....	in-g.	Torbn.	Jacx.
Oneida, A	1	2,290	36x3½	36x5	Cont.	4-3½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta.	worm	Timkn.	Ross
Oneida, B	1½	2,650	36x3½	36x6	Cont.	4-4⅛x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta.	worm	Timkn.	Ross
Oneida, C	2	3,000	36x4	36x7	Cont.	4-4¼x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta.	worm	Timkn.	Ross
Oneida, D	3½	3,700	36x5	36x5d	Cont.	4-4½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta.	worm	Timkn.	Ross
Oneida, E	5	4,750	3ox6	40x12	Cont.	4-5½x5½	Bosch	West.	Pierce	Strom.	H-Shaw	Cotta.	worm	Timkn.	Ross
Overland, Panel	2	900	31x4*	31x4*	Own	4-3⅜x5	Conn.	A-L.*	.....	Till.*	Own	Own	bevel	Own	Own
Overland, Exp	2	900	31x4*	31x4*	Own	4-3⅜x5	Conn.	A-L.*	.....	Till.*	Own	Own	bevel	Own	Own
Overland	5	1,015	33x4½*	33x4½*	Own	4-4⅜x4½	Conn.	A-L.*	.....	Till.	Own	Own	s-bev.	Own	Own
Packard, E	1½	3,000	34x3½	34x3½d	Own	4-4 x5½	Split.	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	2	3,400	34x4	34x4d	Own	4-4 x5½	Split.	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	3	4,100	36x5	36x5d	Own	4-4½x5½	Split.	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	4	4,450	35x5	40x5d	Own	4-4½x5½	Split.	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	5	5,150	36x6	40x6d	Own	4-5 x5½	Split.	Bijur*	Own	Own	Own	Own	worm	Own	Own
Packard, E	6	5,400	36x6	40x7d	Own	4-5 x5½	Split.	Bijur*	Own	Own	Own	Own	worm	Own	Own
Paige, 50	2	.....	36x4	36x5	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Paige, 51	3½	.....	36x7	38x5d	Cont.	4-4½x5½	Eise.	.....	Pierce	Strom.	B-Lipe	B-Lipe	worm	Timkn.	Jacx.
Palmer	1	1,585	34x3½	34x4	Cont.	4-3¾x5	Bosch	.....	Pierce	Strom.	Fuller	Fuller	in-g.	Torbn.	Ross
Palmer	2	2,275	36x3½	36x4d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Panhard, A	1	1,195	32x3½	32x3½	Gray	4-3½x5	A-L	A-L	.....	Strom.*	Fuller	Fuller	in-g.	Torbn.	Lavn.
Panhard, B	1½	1,395	32x3½	32x4	Gray	4-3½x5	A-L	A-L	.....	Strom.*	Fuller	Fuller	in-g.	Torbn.	Lavn.
Panhard, E	2½	2,350	34x4	34x6	Buda	4-4½x5½	Eise.	opt.	Duplx.	Strom.	Fuller	Fuller	in-g.	Torbn	Lavn.
Parker	2	3,150	34x4	36x3½d	Cont.	0-3½x5½	Dixie	West.*	Pierce	Strom.	B-Lipe	Own	worm	Own	Ross
Parker	3	3,700	34x4	36x5d	Cont.	6-3½x5½	Dixie	West.*	Pierce	Strom.	B-Lipe	Own	worm	Own	Ross
Parker	4	4,250	36x5	40x5d	Cont.	6-3½x5½	Dixie	West.*	Pierce	Strom.	B-Lipe	Own	worm	Own	Ross
Parker	5	5,000	36x5	40x6d	Cont.	6-3½x5½	Dixie	West.*	Pierce	Strom.	B-Lipe	Own	worm	Own	Ross
Patriot	1½	2,150	34x3½	34x5	Cont.	4-3½x5	.....	.....	Pierce	Strom.*	.....	.....	.....	.....	.....
Patriot	2½	3,150	34x4	34x7	Cont.	4-4¼x5½	.....	.....	Pierce	Strom.*	.....	.....	.....	.....	.....
Peerless, TC	3	4,125	36x4	40x4d	Own	4 4½x6½	Remy	none	Own	Strom.	Own	Own	chain	Own	Own
Peerless, TC	4	4,150	36x5	40x5d	Own	4-4½x6½	Remy	none	Own	Strom.	Own	Own	chain	Own	Own
Peerless, TC	5	4,700	36x6	40x6d	Own	4-4½x6½	Remy	none	Own	Strom.	Own	Own	chain	Own	Own
Pierce-Ar., X-4	2	3,750	3ox4	36x4d	Own	4-4 x5½	Eise.	West.*	Own	Own	Own	Own	worm	Own	Own
Pierce-Ar., R-9	5	5,500	36x6	40x6d	Own	4-4½x6	Eise.	West.*	Own	Own	Own	Own	worm	Own	Own
Power	2	.....	36x4*	36x4d*	Cont.	4-4½x5½	Simms	.....	Pierce	King	Fuller	Fuller	worm	Timkn.	Ross
Rainier, R-5	¾	1,550	34x4	34x4	Cont.	3-4½x5½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Rainier, R-5	¾	1,250	33x4*	33x4*	Lgt.	4-3½x4½	Simms	none	none	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Rainier, R-2	¾	1,350	34x4*	34x4*	Lgt.	4-3½x4½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Lavn.
Rainier, R-4	1½	1,595	33x4*	34x4	Lgt.	4-3½x4½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Hayes	Lavn.
Rainier, R-6	1½	1,890	34x3	34x4	Cont.	4-3½x5½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Chgo.	Lavn.
Rainier, R-8	2	2,250	34x4	34x6	Cont.	4-3½x5½	Simms	none	Mon.	Zenith	B-Lipe	B-Lipe	worm	Chgo.	Lavn.
Ren.-Leslie, M	2½	2,895	36x5	36x7	Buda	4-4½x5½	Split.	West.	Pierce	Strom.	Warner	Warner	worm	Hayes	Lavn.
Ren.-Leslie, B	8	2,895	36x5	36x7	Buda	4-4½x5½	Split.	West.	Pierce	Strom.	Warner	Warner	worm	Hayes	Lavn.
Reo, F	¾	1,250	34x4½*	34x4½*	Own	4-4½x4½	Remy	Remy*	none	John.	Own	Own	s-bev.	Own	Own
Republic, Desp	¾	1,095	32x3	32x3½	Own	4-3½x5	Remy	Remy	Rugles	Strom.	Own	Own	in-g.	Torbn.	Jacx.
Republic, 9 Sp	¾	1,295	32x3	32x4	Own	4-3½x5	Eise.	none	Rugles	Strom.	Own	Own	in-g.	Torbn.	Jacx.
Republic, 10	1	1,535	34x3	34x4	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Republic, 11X	1½	1,885	34x3½	34x5	Cont.	4-3½x5	Eise.	none	Rugles	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Republic, 19	2	2,395	34x4	34x6	Cont.	4-4¼x5½	Bosch	none	Pharo	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Republic, 20	3½	3,450	36x5	36x5d	Cont.	4-4½x5½	Bosch	none	Pharo	Strom.	Fuller	Fuller	in-g.	Torbn.	Jacx.
Piker, B	3	.....	36x5	36x5d	Own	4-4½xb	Berl.	West.*	Own	Own	Own	Own	worm	Own	Ross
Piker, BB	4	.....	36x5	36x6d	Own	4-4½x6	Berl.	West.*	Own	Own	Own	Own	worm	Own	Ross
Rowe, CDW	2	3,000	34x4	36x7	Wis.	4-4 x5	Bosch	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Rowe, CDW	2½	3,250	34x4	36x4d	Wis.	4-4 x5	Bosch	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, DEW	3	3,800	3ox5	36x5d	.....	4-4 x6	Bosch	none	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, GW	3	.....	38x7	42x9	H-S	.....	A-K	West.*	.....	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Rowe, FW	5	4,900	36x6	40x6d	Wis.	4-4½x5½	Bosch	.....	Duplx.	Zenith	B-Lipe	B-Lipe	worm	Shel.	Ross
Royal	1	2,400	34x4	34x5	Wis.	4-3½x5	Bosch	opt.*	Mon.	Strom.	B.&B.	Own	worm	Timkn.	Ross
Royal	1½	2,800	34x4	34x5	Wis.	4-3⅜x5	Bosch	opt.*	Mon.	Strom.	B.&B.	Own	worm	Timkn.	Ross
Royal	2	3,200	36x4½	36x6	Wis.	4-4 x6	Bosch	opt.*	Mon.	Strom.	B.&B.	Own	worm	Timkn.	Ross
Royal	2½	3,500	36x4½	36x6	Wis.	4-4½x6	Bosch	opt.*	Mon.	Strom.	B.&B.	Own	worm	Timkn.	Ross
Royal	3½	4,200	36x5	38x5d	Wis.	4-4½x6	Bosch	opt.*	Mon.	Strom.	B.&B.	Own	worm	Timkn.	Ross

Name and Model	Tons Capacity	Chassis Price	Front Tires	Rear Tires	Make of Engine	No. Cyl., Bore and Stroke	Ignition	Electric Lighting	Governor	Carbureter	Clutch	Gearset	Final Drive	Axle	Steering Gear
Tiffin, RW	5	5,000	36x6	40x6d	Cont.	6-3¾x5½	Bosch	West.	none	Scheb.	B.&B.	Covert	worm	Shel.	Ross
Tiffin, SW	6	5,200	36x6	40x12	Cont.	6-3¾x5½	Bosch	West,*	none	Scheb.	B.&B.	Covert	worm	Shel.	Ross
Titan, T	3½	4,300	36x5	40x5d	Buda	4-4⅜x6	Bosch	Bosch	Duplx.	Strom.	B.&B.	Cotta	in-g.	Clark	Lavn.
Titan, H	6	5,150	36x6	40x6d	Buda	4-4½x6	Bosch	Bosch	Duplx.	Strom.	B.&B.	Cotta	in-g.	Clark	Lavn.
Tower, F	2	2,975	36x4	36x7	Cont.	4-4⅜x5½	Bosch	none	Pierce	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Tower, G	3½	4,100	3ox5	36x5d	Cont.	4-4 1/16x5½	Bosch	none	Pierce	Strom.	Fuller	Fuller	worm	Timkn.	Ross
Traffic	2	1 395	34x3	34x4	Gray	4-3½x5	Koko.	none	none	Carter	B.&B.	Cover.	in-g.	Russe.	Ditw.
Transport, N	5	2,750	34x3½	34x4d	.....	4-3½x5	Bosch	.....	Mon.	Zenith	.....	.....	worm	.....	.....
Triangle, A	1½	2,185	34x3½	34x6	Wauk.	4-3⅜x5½	Eise.	none	Wauk.	Strom.	Fuller	Fuller	in-g.	Clark	Gem.
Triangle, B	2½	2,850	36x4	36x7	Ruten	4-4⅛x5½	Eise.	.....	Pierce	Strom.	Fuller	Fuller	in-g.	Clark	Gem
Union, B	2½	2,375	36x4	36x7	Cont.	4-4½x5¼	Eise.	none	Duplx.	Scheb.	Fuller	Fuller	in-g.	Russel	Ross
Union, C	4	3,500	36x6	36x5d	Wis.	4-4½x6	Eise.	.....	.....	Scheb.	.....	Fuller	in-g.	Torbn.	.....
U. S., E	2½	2,800	34x4	36x4d	Cont.	4-4¼x5¼	Eise.	.....	Pierce	Strom.	Hart	Cotta	chain	Own	Lavn.
U. S., H	2½	3,250	34x4	36x4d	Cont.	4-4½x5¼	Eise.	.....	Pierce	Strom.	Hart	B-Lipe	worm	Shel.	Lavn.
U. S., D	3½	3,500	3ox5	36x5d	Cont.	4-	Eise.	.....	Pierce	Strom.	Hart	B-Lipe	chain	Own	Lavn.
U. S., J	3½	3,950	36x5	40x5d	Cont.	4-4½x5½	Eise.	.....	.....	Strom.	Hart	B-Lipe	worm	Shel.	Lavn.
U. S., K	5	4,850	36x5	40x6d	Wauk.	4-4½x6¾	Eise.	.....	Wauk.	Strom.	B.&B.	B-Lipe	worm	Shel.	Lavn.
United, AX	1½	.....	36x3½	36x6	Buda	4-3½x5½	Eise.	opt.	Simplx*	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
United, BX	2½	.....	36x4	36x7	Buda	4-4½x5½	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
United, CX	3½	.....	36x5	36x5d	Buda	4-4½x6	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
United, VX	5	.....	36x5	40x6d	Buda	4-4½x6	Eise.	.....	Simplx*	Strom.	B-Lipe	B-Lipe	worm	Shel.	Ross
Universal, G	1½	.....	34x3½	34x5	Buda	4-3⅜x5½	Eise.	.....	Mon.	Zenith	Own	Own	worm	Own	Lavn.
Universal, D	2	.....	36x5	36x4d	Own	4-4½x5½	Eise.	.....	Mon.	Zenith	Own	Own	chain	Own	Lavn.
Universal, L	3½	.....	36x5	36x5d	Buda	4-4½x5½	Eise.	.....	Mon.	Zenith	Own	Own	chain	Own	Lavn.
Velie, 25B	2	2,950	36x4	36x7	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.*	B.&B.	B-Lipe	worm	Timkn.	Gem.
Velie, 26B	3½	3,900	36x5	36x5d	Cont.	4-4½x5½	Bosch	.....	Pierce	Strom.	B.&B,	B-Lipe	worm	Timkn.	Gem.
Vim, 21	½	945	31x4*	31x4*	Own	4-3 x4½	Split.	West.	.....	Zenith	Own	Own	bevel	.....	Jacx.
Vim, 25	1	2,195	34x3½	34x4	Herc.	4-3½x5½	Split.	.....	Duplx.	Zenith	.....	.....	worm	Shel.	Gem.
Vim, 22	2	3,150	36x4	36x6	Herc.	4-3½x5½	Split.	.....	Duplx.	Zenith	.....	B-Lipe	worm	Shel.	Gem.
Vim, 23	3	3,950	36x4	36x4d	Herc.	4-4¼x5½	Split.	.....	Duplx.	Zenith	.....	B-Lipe	worm	Shel.	Gem.
Walter, MO	3	.....	40x4d	40x4d	Own	4-4½x6	.....	none	Own	Zenith	Own	Own	ext-g.	Own	Own
Walter, F	5	5,700	40x7	40x10	Own	4-4½x6½	Eise.	West.*	Own	H&N	Warner	Own	in-g.	Own	Own
Watson, Tractor	5	4,050	34x4	36x5d	Cont.	4-4½x5½	Bosch	none	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Gem.
Weir-Smith	3½	.....	37x7	37x7	Cont.	4-4½x5½	Dixie	.....	.....	Zenith	Fuller	Own	worm	Timkn.	Ross
White, GBBE	3½	2,300	34x4½*	34x4½*	Own	4-3½x5½	.....	.....	.....	none	Own	Own	bevel	Own	Own
White, TBC	1½	3,300	36x4	36x7	Own	4-3½x5½	.....	.....	.....	none	Own	Own	d-rd.	Own	Own
White, TJ	3	4,100	36x5	40x5d	Own	4-3½x5½	.....	.....	none	Own*	Own	Own	d-rd.	Own	Own
White, TG	5	5,000	36x6	40x6d	Own	4-4½x5½	.....	.....	none	Own*	Own	Own	d-rd.	Own	Own
White-Hi., H	1½	2,400	36x3½	36x5	Cont.	4-3½x5	Eise.	none	Pierce	Strom.*	Fuller	Fuller	worm	Timkn.	Ross
Wichita, A	1	1,850	36x3	36x4	Own	4-3½x5	Bosch	Bosch	none	Strom.	Own	Cover.	chain	Shel.	Ross
Wichita, K	1	2,000	36x3	36x4	Own	4-3½x5	Bosch	Bosch	none	Strom.	Own	Cover.	worm	Shel.	Ross
Wichita, L	1½	2,350	3ox3½	36x5	Own	4-3½x5	Bosch	Bosch	none	Strom.	Own	Cover.	worm	Shel.	Ross
Wichita, B	2	2,500	36x3½	36x6	Own	4-3½x5	Bosch	Bosch	none	Strom.	Own	Cover.	chain	Shel.	Ross
Wichita, R	2½	2,950	36x4	36x7	Wauk.	4-3⅜x5½	Bosch	Bosch	Wauk.	Strom.	Hart.	B-Lipe	worm	Shel.	Ross
Wichita, O	3½	3,750	36x5	36x5d	Wauk.	4-4½x5½	Bosch	Bosch	Wauk.	Strom.	Harr,	B-Lipe	worm	Shel.	Ross
Wichita, Q	5	4,600	38x6	38x6d	Wauk	4-4½x5½	Bosch	Bosch	Wauk.	Strom.	Hart.	B-Lipe	worm	Shel.	Ross
Wilcox, S	1	1,950	35x5*	35x5	Cont.	4-3⅜x5	Bosch	none	Pierce	Strom.	B-Lipe	B-Lipe	worm	Shel.	Own
Wilcox, X	1½	2,775	36x4	30x5	Own	4-4½x5	Bosch	none	Pierce	Strom.	Own	Own	worm	Shel.	Own
Wilcox, Q	2½	3,250	36x4	36x3½d	Own	4-4½x5	Bosch	none	Pierce	Strom.	Own	Own	worm	Shel.	Own
Wilcox, P	3½	3,950	36x5	36x5d	Own	4-4½x5	Bosch	.....	Pierce	Strom.	Own	Own	worm	Shel.	Own
Wilcox, W	5	4,850	36x5	40x12	Wauk.	4-4⅜x6½	Bosch	none	Wauk.	Strom.	Own	Own	worm	Shel.	Own
Wilson	1	1,750	35x5*	35x5	Cont.	4 3½x5	Eise.	opt.	Pierce	Strom.	B.&B.	Covert	worm	Timkn.	Own
Wilson	2	2,800	36x4	30x7	Cont.	4 4½x5½	Eise.	opt.	Pierce	Marvel	Hart.	Covert	worm	Timkn.	Own
Wilson	3½	3,800	36x5	30x5d	Cont,	4-4½x5½	Eise.	opt.	Mon.	Strom.	B.&B.	Warner	worm	Timkn.	Own
Wilson	5	4,600	36x6	40x6d	Cont.	4-4½x5½	Eise.	opt.	Mon.	Strom.	B.&B.	Warner	worm	Timkn.	Ross
Winther, 39	1½	2,150	34x3½	34x5	Wis.	4-3½x5	Eise.	Bijur*	Simplx.	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Winther, 49	2	3,000	36x4	36x4d	Wis.	4-4 x6	Eise.	Bijur*	Simplx.	Mast.*	B.&B.	B-Lipe	in-g.	Clark	Ross
Winther, 69	3	3,800	36x5	36x5d	Wis.	4-4 x6	Eise.	Bijur*	Simplx.	M st.*	B.&B.	B-Lipe	in-g.	Clark	Ross
Winther, 89	4	4,200	36x5	40x5d	Wis.	4-4½x6	Eise.	Bijur*	Simplx.	Mast.*	B.&B.	B-Lipe	in-g.	Clark	Ross
Winther, 109	5	5,000	36x6	40x6d	Wis.	4-4½x5½	Eise.	Bijur*	Simplx.	Mast.*	B.&B.	B-Lipe	in-g.	Clark	Ross
Winther, 129	6	5,250	36x6	40x12	Wis.	4-5⅛x6	Eise.	Bijur*	Simplx.	Mast.*	B.&B.	B-Lipe	in-g.	Clark	Ross
Winther, 149	7	5,500	36x6	40x7d	Wis.	4-5½x6	Eise.	Bijur	Simplx.	Mast.*	B.&B.	B-Lipe	in-g.	Clark	Ross
Winther, 439	1½	2,100	32x4	32x4	Gray	4-3½x5	Eise.	.....	.....	Strom.	Fuller	Fuller	in-g.	Clark	Lavn.
Winther, 499	3½	4,900	36x5	36x5d	Wis.	4-4½x6	Eise.	Bijur	.....	Mast.	B.&B.	B-Lipe	in-g.	Clark	Ross
Wisconsin, B	1½	1,750	34x3½	34x4	Wauk.	4-3½x5½	Eise.	none	Wauk.	Mast.	Fuller	Fuller	worm	Shel.	Lavn.
Wisconsin, C	2½	2,850	36x4	36x6	Wauk.	4-4 x5½	Eise.	none	Wauk.	Mast.	Fuller	Fuller	worm	Shel.	Lavn.
Witt-Will, WD-16	1	1,850	36x3*	36x4*	Cont.	4-3⅜x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Witt-Will, WD-18	2½	2,850	36x3½*	30x3½d	Cont.	4-4½x5½	Eise.	.....	Pierce	Zenith	B-Lipe	B-Lipe	worm	Timkn.	Ross
Wolverine, C	1½	2.250	34x3½	34x5	Cont.	4-3¾x5	Split.	G&D*	Mon.	Strom.	Fuller	Fuller	in-g.	Russel	Gem.

Abbreviations: **Engine**—Wauk., Waukesha; Cont., Continental; H-S, Herschell-Spillman; Lyc., Lycoming; N.A., North American; Herc., Hercules; Mil., Milwaukee; Wis., Wisconsin; LeR., LeRoi; GBS, Golden, Belknap & Swartz; Beav., Beaver. **Ignition**—Eise., Eisemann; A-K, Atwater Kent; Koko., Kokomo; Split., Splitdorf; Conn., Connecticut; Lau., Lauraine; Berl., Berling; A-L, Auto-Lite. **Electric Lighting**—Nlite, Nicolite; G&D, Gray & Davis; A-L, Auto-Lite; Dneto., Dyneto; Al-Ch., Allis-Chalmers; West., Westinghouse; L-N, Leece-Neville; Det., Detroit; N-E, North East; Wag., Wagner; Asterisk, electric starting also. **Governor**—Wauk., Waukesha; Duplx., Duplex; Cont., Continental; Mon., Monarch; Simplx., Simplex; McCan., McCanna; Rugles, Ruggles. **Carbureter**—Scheb., Schebler; Strom., Strombere; Ray., Rayfeld; King., Kingston; Mon., Monarch; Shake., Shakespeare; Car., Carter; Flech., Fletcher; Holl., Holley; Ens., Ensign; Mast., Master; John., Johnson; Stew., Stewart; Till., Tillotson; Asterisk, vacuum fuel feed. **Clutch**—B.&B., Borg & Beck; B-Lipe, Brown-Lipe; Det., Detroit; H-Shaw, Hele-Shaw; Mech., Mechanics; M&E, Merchant & Evans; Lyc., Lycoming; W. G. Co., Warner Gear Co. **Gearset**—B-Lipe, Brown-Lipe; G-Lees, Grant-Lees; Det., Detroit; Mech., Mechanics; Cover., Covert; Savg., Savage Arms. W. G. Co., Warner Gear Co. **Final Drive**—in-g., internal gear; d-rd., double reduction; s-bev., spiral bevel; ext-g., external gear. **Axle**—Timkn., Timken; Torbn., Torbenson; Key-H, Keystone-Hindley; Shel., Sheldon; Salsby., Salisbury; Ind., Industrial; Chcgo., Chicago-Standard; Chgo., Chicago; W-W., Walker-Weiss; Emp., Empire. **Steering Gear**—Gem., Gemmer; Lavn., Lavine; Warn., Warner; Ditw., Ditweiler; Jacx., Jacox; Fost., Foster; Wol., Wohlrab. **Tires**—Asterisk, pneumatic.

Lamp Bulbs for 1919 Passenger Cars

Motor Age Maintenance Data Sheet No. 37

One of a series of weekly pages of information valuable to service man and dealer—Save this page

Car and Model	Base Contact	Headlights Volts	Headlights CP.	Sidelights Volts	Sidelights CP.	Taillight Volts	Taillight CP.	Dashlight Volts	Dashlight CP.
Allen—41	Single	6-8	18*	6-8	4	6-8	2	6-8	2
American—B	Single	6-8	15*	6-8	4	6-8	2	d 6-8	2
Anderson—400 F	Single	6-8	12	6-8	2	6-8	2	6-8	2
Anderson—400 A	Single	6-8	12	6-8	2	6-8	2	6-8	2
Apperson—8-19	Single	6-8	15*	6-8	4	6-8	2	d 6-8	2
Auburn—6—39	Single	6-8	15*	6-8	4	6-8	2	d 6-8	2
Austin—12	Single	6-8	24	6-8	16	6-8	6	6-8	3
Biddle—H	Single	6-8	18*	6-8	4	6-8	2	d 6-8	4
Birch—45	Single	6-8	15*	6-8	4	6-8	4	d 6-8	4
Birch—36	Double	6-8	15*	6-8	4	6-8	2	6-8	4
Briscoe—4-24	Single	6-8	21	—	—	6-8	4	d 6-8	4
Buick	Single	6-8	16*	—	—	6-8	3	6-8	3
Cadillac—57		6-8	18	6-8	6	3-4	2	3-4	2
Case—U-19	Single	6-8	18	6-8	4	6-8	2	d 6-8	2
Chalmers—35-C	Single	6-8	15	6-8	4	6-8	2	6-8	2
Chandler	Single	6-8	16	6-8	4	6-8	2	6-8	2
Chevrolet	Single	6-8	20	6-8	4	6-8	4	6-8	4
Cole—870	Single	6-8	21*	6-8	12	6-8	4	d 6-8	6
Columbia—CD & CS	Single	6-8	15*	6-8	4	6-8	2	d 6-8	2
Comet—C-51	Single	6-8	—	3-4	—	3-4	—	3-4	—
Crow-Elkhart—K-36		6-8	16	6-8	4	6-8	2	6-8	2
Cunningham—V-3		6-8	21	6-8	6	6-8	2	6-8	4
Daniels—8-B	Single	6-8	18	6-8	2	6-8	4	6-8	2
Davis		6-8	18	—	—	6-8	2	6-8	2
Dixie Flyer	Double	6-8	15	—	—	3-4	2	3-4	2
Dodge Brothers	Single	12-18	15	—	—	12-18	2	12-18	2
Dorris	Single	6-8	21*	6-8	4	6-8	4	6-8	4
Dort—15	Single	6-8	15	—	—	6-8	4	6-8	2
Elcar		6-8	15	6-8	4	5-8	2	6-8	2
Elgin—Series H	Double	6-8	15	—	—	6-8	3	6-8	2
Essex—A	Single	6-8	15	—	—	3-4	2	3-4*	2
Ford—T		6-8	17	6-8	2	6-8	2	—	—
Franklin—9	Double	12-18	21*	12-18	4	8	2	12-18	2
Geronimo	Single	6-8	21	—	—	6-8	2	6-8	2
Glide—6-40	Single	5-8	15*	6-8	4	6-8	2	d 6-8	2
Grant	Single	6-8	20	6-8	2	6-8	2	6-8	2
Harroun		6-8	20	—	—	3-4	6	3-4	6
Harvard—4-20		6-8	—	3-4*	—	3-4*	—	3-4*	—
Hatfield—A	Single	6-8	15*	4-8	4	6-8	4	6-8	2
Haynes—45	Double	6-8	16	6-8	—	6-8	2	—	—
Haynes—46	Double	6-8	18*	6-8	12	6-8	2	6-8	2
Hollier—198	Single	6-8	15	—	—	3-4	2	d 3-4*	2
Hollier—206	Single	6-8	15	—	—	3-4	2	d 3-4*	2
Holmes	Double	12-16	30*	12-16	4	6-8	2	6-8	2
Hudson Super Six	Single	6-8	5	6-8	4	3-4	2	3-4*	2
Hupmobile—R	Single	6-8	15	6-8	2	6-8	2	6-8	2
Jones	Double	6-8	15*	6-8	4	S 6-8	2	S 6-8	2
Jordan	Single	6-8	21*	6-8	4	6-8	3	6-8	3
King—8	Single	6-8	18*	6-8	4	6-8	4	6-8	2
KisselKar	Single	6-8	18*	6-8	4	6-8	2	6-8	2
Kline Kar 642 S. 8	Single	6-8	15	—	—	6-8	4	d 6-8	4
Lexington—R-19	Single	6-8	32*	6-8	8	6-8	2	d 6-8	4
Liberty Six—10B	Single	6-8	15*	6-8	4	6-8	2	6-8	2
Locomobile—38-2	Single	6-8	21	6-8	6	6-8	4	6-8	2
Locomobile—48-2	Single	6-8	21	6-8	6	6-8	4	6-8	2
Maibohm—B	Single	6-8	16	6-8	4	3-4	2	3-4*	2
Marmon—34	Single	6-8	30*	6-8	9	6-8	2	6-8	4
Maxwell—25	Double	12-16	24*	12-16	2	12-16	2	12-16	2
McFarlan—127	Single	6-8	21*	6-8	12	6-8	2	6-8	2
Mercer—Ser. 4	Single	6-8	24*	6-8	4	6-8	4	6-8	4
Mitchell—E-40	Double	6-8	14	—	—	S 6-8	4	6-8	4
Moline Knight—L		6-8*	15*	6-8	4	6-8	2	6-8	2
Moon	Single	6-8	18	—	—	6-8	2	d 6-8	2
Moore—30	Single	6-8	20	6-8	—	6-8	2	—	—
Nash	Single	6-8	18*	6-8	4	6-8	2	6-8	2

Car and Model	Base Contact	Headlights Volts	Headlights CP.	Sidelights Volts	Sidelights CP.	Taillight Volts	Taillight CP.	Dashlight Volts	Dashlight CP.
National—6	Single	6–8	16*	6–8	6	6–8	4	d 6–8	2
National—12	Single	6–8	18*	6–8	6	6–8	4	d 6–8	2
Oakland—34-B	Single	6–8	—	—	—	6–8	2	6–8	2
Oldsmobile—37-A		6–8	15*	—	—	6–8	2	6–8	2
Oldsmobile—45-A		6–8	15*	—	—	6–8	2	6–8	2
Overland—90		6–8	12	—	—	3–4	2	3–4*	2
Packard—3-25	Single	6–8	24*	6–8	4	6–8	2	6–8	2
Packard—3-35	Single	6–8	24*	6–8	4	6–8	2	6–8	2
Paige—6-40	Single	6–8	18*	6–8	4	6–8	2	d 6–8	2
Paige—6-55	Single	6–8	18*	6–8	4	6–8	2	d 6–8	2
Phianna—L	Double	6–8	15*	6–8	4	6–8	4	6–8	2
Paterson—6-46		6–8	24	6–8	4	3–4	3	3–4*	3
Peerless—Ser. 4	Single	6–8	18	—	—	6–8	4	6–8	2
Piedmont		6–8	15	—	—	6–8	—	6–8	2
Pierce-Arrow—B-5	Single	6–8	21*	6–8	4	6–8	4	6–8	4
Pilot—6-45	Single	6–8	15	—	—	6–8	6	6–8	6
Premier—6-C	Double	6–8	21*	6–8	4	6–8	2	6–8	2
Reo—T&U	Double	6–8	15	—	—	3–4	2	3–4*	2
Revere	Double	6–8	20*	6–8	8	6–8	4	6–8	4
Roamer—6-54	Single	6–8	16*	5–8	4	6–8	4	d 6–8	4
Saxon Y—18	Single	6–8	15	—	—	6–8	2	6–8	2
Sayers	Single	6–8	15	—	—	6–8	2	d 6–8	2
Scripps Booth	Single	6–8	15	—	—	6–8	2	6–8	2
Seneca—H	Single	6–8	15	6–8	2	6–8	2	d 6–8	2
Singer—"19"	Double	6–8	32	6–8	4	6–8	2	6–8	2
Standard—8 G	Single	6–8	32*	6–8	4	6–8	2	6–8	2
Stanley—735	Single	6–8	18*	6–8	2–4–6	6–8	2	6–8	2
Stearns—SKL-4	Single	12–16	12*	12–16	4	12–16	2	12–16	2
Stephens—76	Single	6–8	15	6–8	2	6–8	2	6–8	2
Studebaker—EH	Single	6–8	12	—	—	6–8	2	6–8	2
Stutz—G		6–8	15*	—	4	6–8	4	6–8	4
Templar—445	Single	6–8	18*	6–8	4	6–8	2	6–8	2
Tulsa—A-D-1	Single	6–8	21	6–8	2	6–8	2	d 6–8	2
Velie Biltwel—38	Single	6–8	15*	6–8	4	6–8	4	d 6–8	4
Westcott	Single	6–8	15*	6–8	4	d 3–4	2	d 3–4*	2
Willys-Knight—88-4 S-D2		6–8	16	—	—	3–4	2	3–4*	2
Winton Six—22	Single	6–8	21	6–8	12	6–8	4	6–8	4
Winton Six—22-A	Single	6–8	21	6–8	12	6–8	4	6–8	4

* (C.P.)—Double bulb headlight. * (Volts)—Dashlight in series with taillight. d—double contact. s—single contact.

Selden Special Supercedes Smaller Truck

1½-Ton Job Lists at $2,185—Uses Continental Engine and Timken-Brown Worm-Drive Axle

THE new Selden 1½-ton worm-drive truck, known as the Selden Special, listing at $2,185, is ready for delivery. The truck is equipped with the in-block Continental Red Seal engine, model N, four cylinders. The bore and stroke is 3¾ by 5 in., giving an S.A.E. rating of 22.5 hp. The controlled speed of the engine is 1200 r.p.m., with the Pierce governor. The rest of the make-up includes Timken David Brown rear axle, Brown & Lipe clutch and transmission, Spicer-Sheldon universal joints, Timken bearings and Stromberg carbureter.

Set Spark Ignition

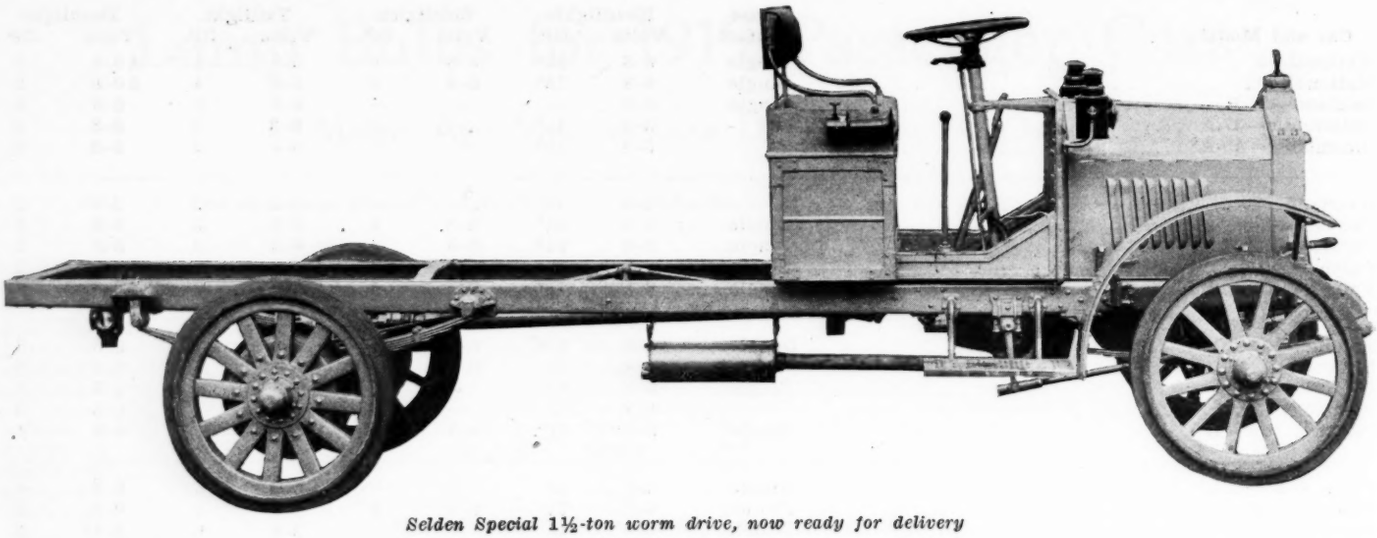
The engine uses a set spark magneto ignition and has a three-bearing crankshaft. The bearings are all large and well proportioned. They are carried in the aluminum crankcase and made accessible by removing the bottom pan. All bearings are bronze backed and made of nickel babbitt. The engine block is of special air-furnace gray iron, and after being rough bored are set aside for ageing. This is an insurance against the familiar piston slap resulting from blocks not properly aged. The engine valves are two piece construction, the heads, 1 1/16-in. in diameter, being made of nickel steel and welded to carbon steel stems. The camshaft is one piece and lubricated by oil collecting in the pockets at the bearings.

The engine lubrication system is of the combined force-feed and splash type. A horizontal plunger pump driven from an eccentric on the camshaft forces oil through copper tubes to the timing gears and over the main bearings. It drains back into the oil sumps where the overflow system maintains the proper level for the scoops on the connecting rods.

Hotchkiss Drive

The drive from the engine is through a Brown-Lipe-Sheldon, ten-plate, raybestos-faced dry plate clutch to the three-speed transmission. These units are all incorporated in one. From the transmission the drive is through the Spicer joints and tubular drive shaft, to the worm-driven Timken rear axle. Here the drive is taken by the springs, employing the Hotchkiss principle.

The radiator is of the vertical tube type,



Selden Special 1½-ton worm drive, now ready for delivery

with cast tanks and removable core, mounted on ball trunnions designed to insulate the radiator from frame weaving and vibration due to road shocks. The steering gear is of the worm and nut type, irreversible, and gives to the truck a turning radius of 23 ft. The springs throughout are of the semi-elliptic type, 40 in., front, and 50 in., rear. Brakes, both service and emergency, are located on the rear wheels, and each are internal expanding. Tires for the front are 34 by 3½ in. single and 34 by 5 in. single on the rear. The wheels are made adaptable for pneumatic equipment.

New Dixie Flyer Models at $1,365

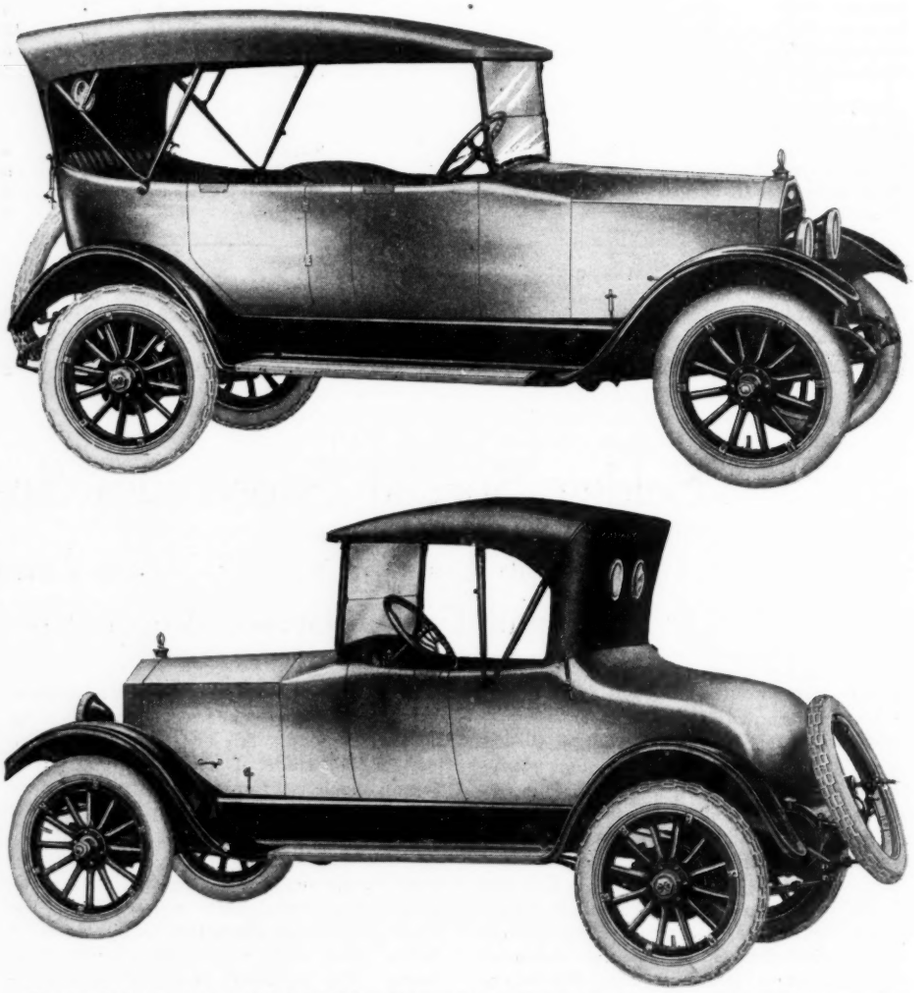
THE new Dixie Flyer, model H-S 50, built by the Kentucky Wagon Mfg. Co., Louisville, Ky., has many refinements and improvements over former models and comes in roadster and touring types, both listed at $1,365. This car was brought out to meet present day requirements in weight, performance and economy, at a medium price. Standard units like the Herschell-Spillman engine, Borg & Beck clutch, Grant-Lees transmission, etc., make up the car.

Among the improvements is a more efficient engine. The engine has a force-feed high pressure oiling system, hot-spot manifold and hot air vacuum jacket, while instead of being swung on brackets, the engine is bolted directly to the frame. The fan is now driven from the generator instead of camshaft, said to eliminate gear noise at low speeds. To shorten the wiring the igniter and coil are located at the rear of the engine. The engine is three-point suspended with adjustable front connection. To handle the increased horsepower a larger universal joint has been fitted.

Radiator Core on Springs

There is a variable temperature control of the carbureter mixture on the dash and instead of the battery indicator formerally used an ammeter is fitted. Instead of castings the clutch and brake pedals are drop-forged. Oil cups have replaced the grease variety on all steering connections and spring links. The frame has been made longer and the rear spring suspension lowered. The tire carrier has been simplified and is interchangeable on both models. The radiator capacity has been doubled, the core mounted on springs with independent shell.

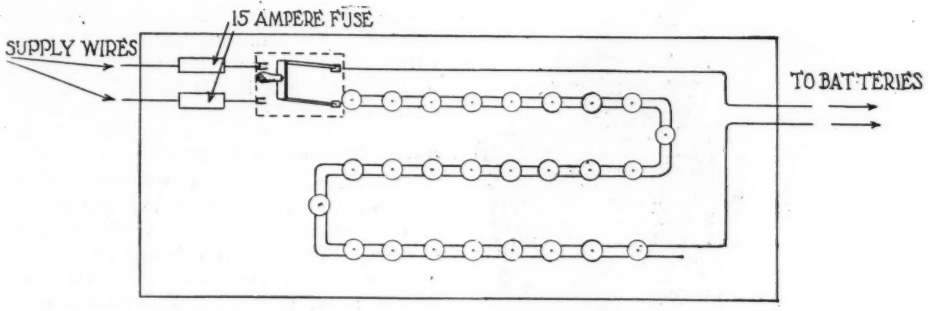
The seats are deeper and wider, doors larger and the curtains open with all doors. Instead of rubber matting the floors are covered with linoleum, metal bound. Celluloid windows in rear curtain have been replaced with bevel glass types. Upholstery is Turkish plait. The wheelbase is 112 in. and the tire size 32 by 4 in. all around.



Two and five passenger Dixie model. The cooling system of the new engine eliminates the louvers in the hood

The Motor Car Repair Shop

Practical Maintenance Hints

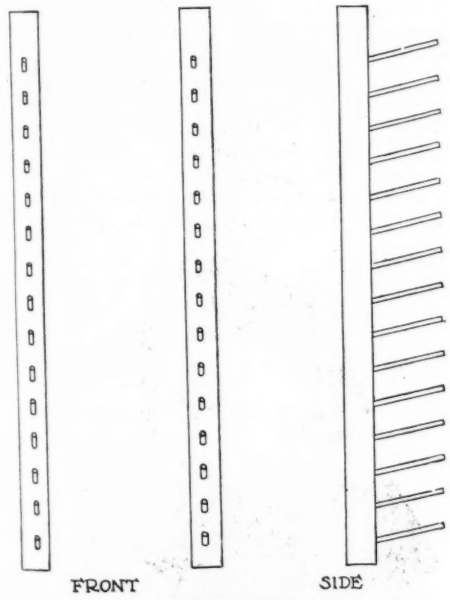


Battery Charging Board

THE lamp board shown is recommended by Willys-Overland for charging up to six storage batteries. The lamps are 100-watt Mazda and are spaced 4¼ in. apart. Following is the charging schedule:

Batteries on charge	Lamps at start	Lamps at finish
1	13	4
2	15	5
3	16	5
4	17	6
5	19	6
6	20	7

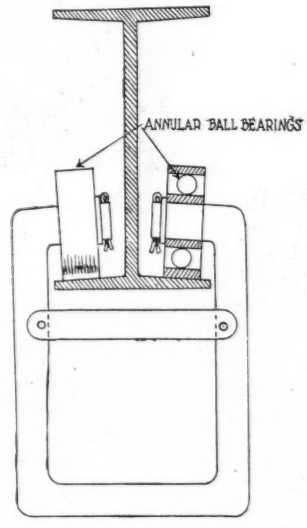
The batteries should be kept in circuit with the number of lamps indicated in the "Start" column until the specific gravity stops rising and then put on the "Finish" rate for 2 hr. If the battery overheats or gases, one or more lamps should be cut out. —Connel & McCone, Overland, Boston, Mass.



RACK FOR SPRINGS, ETC.

Rack for Springs

The storage of long, narrow heavy members such as bar stock, driveshafts, springs and the like, whether in accessory stock room or shop parts room, is accomplished by placing parallel 3 by 3 yellow pine members vertically between floor and ceiling and inserting in them long metal pegs sloped slightly upward.

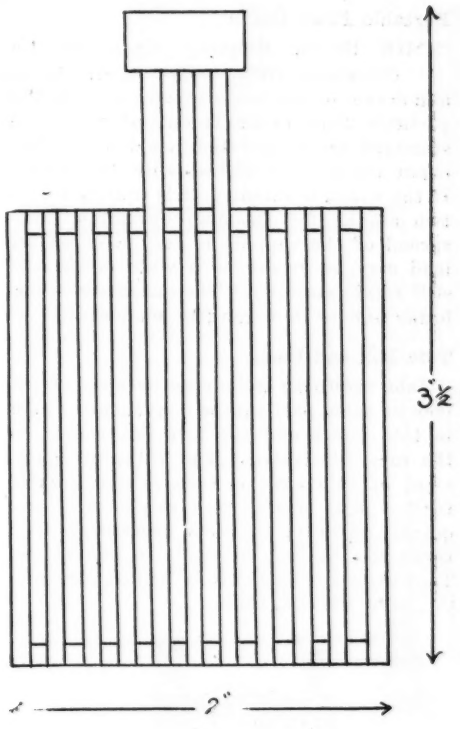


Traveling I-Beam Hoist

A traveling hoist may be readily constructed—using any convenient I-beam supporting the floor above as a rail—and the car to run on this rail and which will carry the hoist may be built out of some steel stock and two annular ball bearings. The frame of the car is a heavy piece of bar stock bent and finished as shown. It is slipped over the lower flanges of the rail and then the bearings are put on, after which the washers and heavy cotterpins are put in place. If there is any likelihood of the loads pulling out or expanding the vertical members of the frame, a cross-brace, as shown, may be riveted in place.

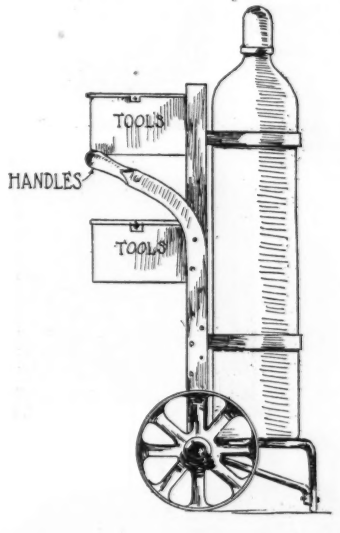
Body Bolt Wrench

The wrench shown is recommended especially for undoing body bolts. It can be made from an ordinary straight wrench by bending one end to the angle indicated.—Connel & McCone, Overland, Boston, Mass.



Wide Creeper

A wide creeper is recommended by a New York truck dealer as being more comfortable and generally satisfactory than the usual narrow type.



Oxygen Acetylene Truck

A two-wheeled hand truck resembling a baggage truck is a convenient vehicle for carrying the oxygen and acetylene cylinders as well as all the necessary fittings and tools required. The latter are carried in two boxes fastened to the back of the truck.

Service Equipment

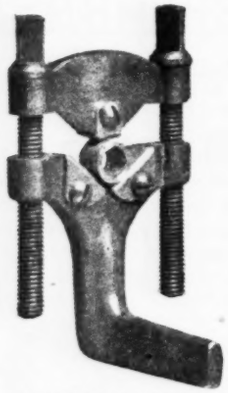
Time Savers of the Shop

Portable Floor Crane

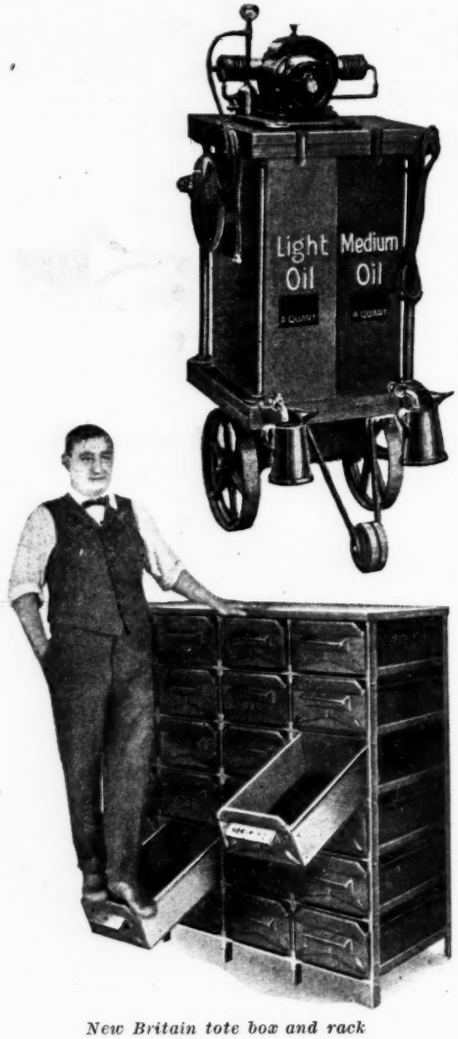
THE Brown Hoisting Machinery Co. Cleveland, Ohio, makes several hoists and cranes of use to the service station. The portable floor crane is one of these. A standard crank-operated winch or a Yale chain block is furnished with this crane. If the winch is supplied, it is equipped with two cranks for two-man operation. The spread of the support is very wide so the load may be swung on a wide radius and still retain stability. The automatic wheel brake assists this stability somewhat.

Tote Box and Rack

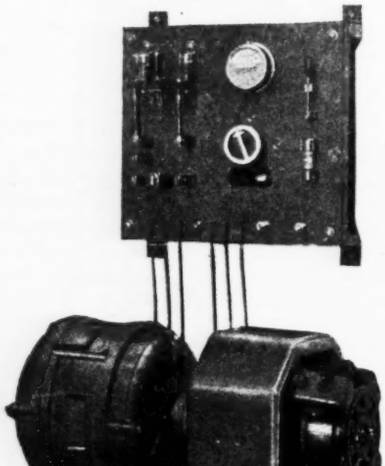
Jobs requiring holdovers because of the lack of some part can be conveniently kept in tote boxes and the tote boxes kept in the rack illustrated. The value of equipment of this kind is seen in the greater facility with which work can be held and quickly referred to when necessary. The racks can be had in any size and shape. They are made by the New Britain Machine Co., New Britain, Conn.



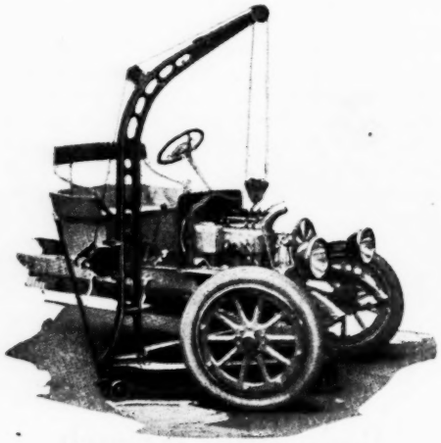
Brass-faced dog for lathe work



New Britain tote box and rack



St. Louis battery charger



Brown hoist portable floor crane

Lathe Tools

The Ready Tool Co., Bridgeport, Conn., recommends for garage work a set of lathe tools. One of the tools is the brass-faced lathe dog for handling polished bushings, valves, tappets, etc. The most useful size to the repairman is the ¼ to 1½-in. style which sells for $1.75.

Bacon Sectional Vulcanizer

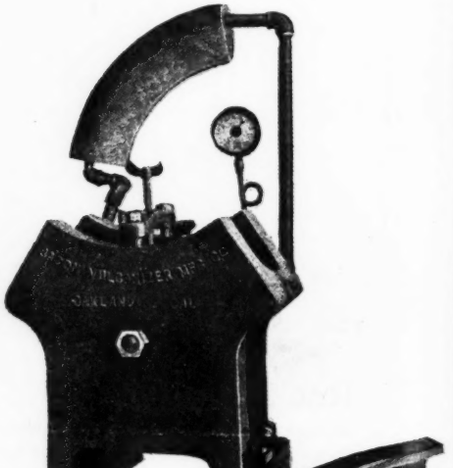
The Bacon vulcanizer was brought out to meet the demands of the garage and service station whose tire repair business is small. The capacity being about eight or nine tires a day. The mold fits 4 and 4½-in. tires, and when the matrix is inserted it fits 3 and 3½-in. tires. The mold is about 18 in. long, so it takes about five heats to cure a whole tire. The outfit is made by the Bacon Vulcanizer Mfg. Co., Oakland, Cal., and sells for $90 complete.

Battery Charging Set

For the station doing general electrical repairing the motor-generator set made by the St. Louis Electrical Works, St. Louis, Mo., should prove to be a valuable addition to the battery department. The set, at 24 volts, has a capacity of 14 amp., and this current can be tapped off from the two auxiliary panels so that distribution for several batteries is possible. The motor is started by a double-throw switch, eliminating any starting rheostat.

Air and Oil Service

Here is a machine designed primarily to lower the cost of free air. While the motorist is filling up his tires, he sees the near and handy oil tank and decides that he might as well purchase oil while filling up his tires. The mounting of the electric motor on the oil tank is such that it conforms with underwriters' requirements. The oil tanks hold 20 gal. each. The compressor is made by the General Utility Co., 1326 Ogden street, Philadelphia, Pa.



Bacon sectional vulcanizer

The Accessory Corner

New Fitments for the Car

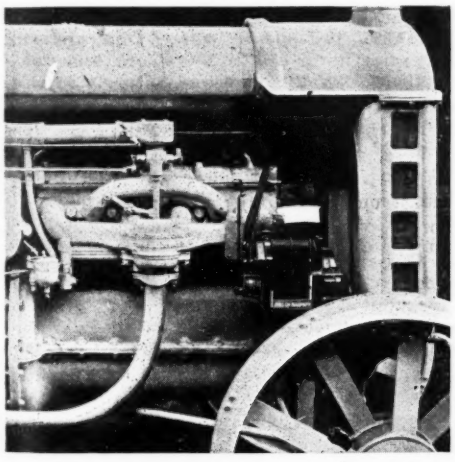
Atlas Wheel

THE spring wheel made by the Atlas Wheel Co., Cleveland, Ohio, is a product that has been given the test the air service gives during war times, having been used on some of the largest tractor airplanes. The wheels will be offered for all makes of cars soon, the present production program being outlined for Fords only. The Ford replacement is a matter of a few moments, a monkeywrench and $65, giving the additional advantage of having demountable rims.

Atlas spring wheel

Bosch Magneto for Fordsons

The Bosch Magneto Co., New York, has developed a magneto for the Fordson tractor. The illustration shows the gearcase and attachments that come with it. No extra machine work is necessary, other than to apply it with the ordinary tools. It was described in detail in MOTOR AGE, issue of April 3.



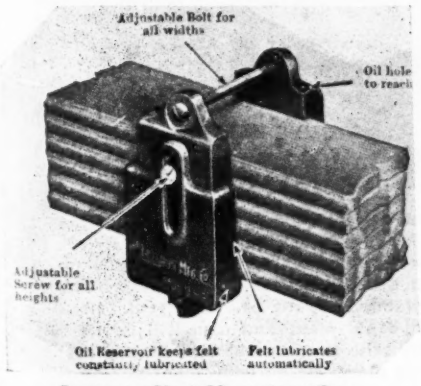
Bosch magneto for Fordson tractor

Kant-Mis Spark Plug

The Kant-Mis Spark plug has a very unusual type of electrode. The center conductor is large and retains its heat after the explosion stroke. The outer electrode is slanting and any cool oil that may strike it will drip off at the bottom, there being no place for the oil to lodge and, later, carbonize. The plug is made by the Kant-Mis Spark Plug Co., Green Bay, Wis., and sells for $1.25.

Adjustable Spring Oiler

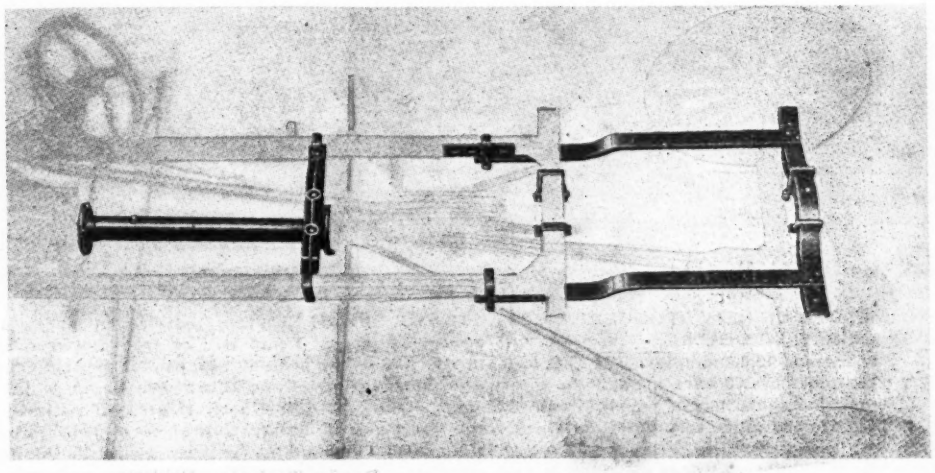
A spring oiler that is adjustable and fits every size and type of spring is made by the Lazarus Mfg. Co., Cleveland, Ohio. The operation of the oiler depends on the capillary action of the oil as it seeps through a felt oil pad. The oiler does not interfere with the regular action of the springs, because it is not clamped to any other part of the frame.


Adjustable Bolt for all widths
Adjustable Screw for all heights
Oil Reservoir keeps felt constantly lubricated
Felt lubricates automatically

Lazarus adjustable spring oiler

Hay-Dee Extension

With the Hay-Dee extension the regular Ford chassis can be converted into a chassis having 115-in. or 130-in. wheelbase, depending on the needs of the user. It is not necessary to drill a hole or change any part of the Ford in applying these extensions, a hammer and a monkeywrench being the only tools required. The extension is made by the Hayes-Diefenderfer Co., Inc., 1876 Broadway, New York, selling for $55 and $60 for the 15-in. and 30-in. extensions respectively.



Hay-Dee extension for Fords, showing torque tube extension and brace

Loop Head Tire Chain

The Galesburg Chain Co., Galesburg, Mich., is putting out a tire chain that presents to the road small gripping studs, flat on the reverse side, so no injury is done to the tire. The chains are applied in the usual manner.

Stopshock Shock Absorber

Stopshock shock absorbers are very simple in their construction and are easily applied, it is said. The absorbers cost $7.50 for four and are manufactured by the K. & S. Supply Co., Fisher building, Chicago.

Stopshock shock absorber for Fords.

Right, Kant-Miss spark plug

Among the Makers and Dealers

Short Trade Notes

CONTINENTAL Declares Dividend—The Continental Motors Corp. will pay a dividend of 1½ per cent May 15 to stockholders holding common stock of record May 10.

Whalen with International Tire—Martin K. Whalen has joined the force of the International India Rubber Co., South Bend, as its southern representative. He has been acting as special representative for the Century Plainfield Tire Co.

DeLisser Ajax President—Horace DeLisser has been made president of the Ajax Rubber Co., succeeding H. L. McLaren, who resigned recently. C. R. Collins, advertising manager, resigned his position a few weeks ago. His successor has not yet been appointed.

Trade Associations Plan Outing—The Motor Truck Association of Philadelphia will hold its annual outing June 21 at Kugler's Mohican Club, with Philadelphia Automobile Trade Association, the Automobile Accessories Business Association and the Camden Automobile Trade Association.

Slosson on Coast as Manager—Steward Slosson has been appointed Pacific Coast manager of the Rubber Products Co. He was for several years coast representative for Firestone motorcycle tires. The Rubber Products Co. is increasing its manufacturing and storage space at its Barberton, Ohio, factories.

Pearmain Joins Wallis Tractor—Capt. W. J. Pearmain, late instructor of artillery, A. E. F., has returned from France and has been appointed experimental engineer with the Wallis Tractor Co., Racine, Wis. Before going overseas Captain Pearmain was in charge of the experimental department of the Mitchell Motors Co.

Tennant with Des Moines Concern—J. W. R. Tennant, formerly vice-president of the Tennant Motor Co. and the Tennant Oakland Co., Chicago, has assumed active management of the Iowa Guarantee Mortgage Corp., Des Moines, Iowa. This concern was organized about a year ago to give a special time payment banking service to the motor car and truck dealers of the state to finances their time payment business. Officials of the company decided that as long as the company's business was to be almost exclusively with the motor car men, they should have a man thoroughly familiar with the motor car field.

House Is Republic Coast Manager—F. M. House, with the Republic Truck Co., Alma., Mich., for many years, has been made Pacific Coast manager of that company with headquarters at Portland, Ore.

Franklin Is Distributing Manager—George W. Franklin, formerly of Detroit, is now manager of the Securities Motor Corp., Los Angeles, Cal. This organization succeeds the Leach Motor Car Co., distributer of Mitchell and Premier cars in southern California.

Reading Trade Forms Association—Application has been made for a charter for the Reading Automobile Trade Association, Reading, Pa. The petition states that the yearly income of the corporation from other sources than real estate shall not exceed $5,000, which is to be derived principally from admission fees and members' fees. Any individual engaged in the motor car trade or affiliated industries is eligible for membership.

Service Record 100 Per Cent—An unusual patriotic record is that held by the employees of the three Buffalo tire and accessory stores of Whinihan Brothers & Co. Every man in the company's three stores has seen service in France with the American army. One former employee, Frank Wells, was killed in action with the 311th Infantry. Lieut. Sam Whinihan and Charles B. Britton, two of the firm's employees, were in the first American draft. Every other employee now with the firm saw service overseas.

Distributer Plans Increased Business—The Capital Auto Co., Lansing, Mich., distributer of the Dodge and Mitchell, has increased its capital stock from $25,000 to $60,000, to provide for increased business operations. Stories and service stations in the principal towns and cities in the territory are to be added as rapidly as possible. Lansing will become the distributing point for the Dodge for Ingram and Clinton counties, the principal part of Eaton county and the eastern half of Michigan for the Mitchell. There is no change in the personnel of officers, the following continuing: President, J. Edward Roe; vice-president, Rudolph Loomis; secretary, O. R. Starkweather; treasurer, George J. Bohnet.

Lotz with Hilo Varnish—H. H. Lotz, for many years with Lowe Brothers Co., has joined the sales force of the Hilo Varnish Corp. He will cover southern Ohio with headquarters at Dayton.

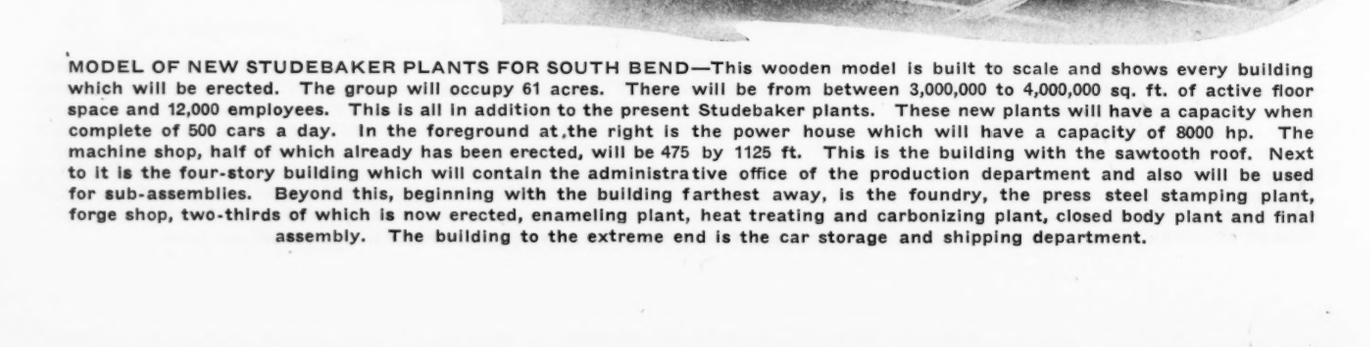
Lee Now with Saxon—Harry S. Lee, during the war superintendent of the Wright-Martin Corp., Long Island City, has been made factory manager of the Saxon Motor Car Corp., Detroit. Before entering Government service he was manager of the Aluminum Castings Co., Detroit.

To Make Truck Bodies Now—F. C. Rittenhouse, manufacturer of mine cars and mine supplies, in Philipsburg, Pa., is increasing the size of his plant to make room for the extended manufacture of truck bodies and motor car springs in all sizes. Several buildings will be erected to care for this department.

Hunt New Sales Manager for Disteel—George H. Hunt has been appointed sales manager of the Detroit Pressed Steel Co. For several years Mr. Hunt was manager of the Detroit branch of the Stromberg Carbureter Co. and for the last year was Detroit representative of the Edward G. Dudd Mfg. Co. and the Budd Wheel Corp.

Lundane in Charge of New York Office—G. R. Lundane has been placed in charge of the office of the Black & Decker Mfg. Co., Baltimore, Md., just opened in New York, and will supervise its sales for New York and Connecticut. Mr. Lundane was formerly service manager for Thomas B. Jeffery Co., Kenosha, Wis., and recently has been with Findeisen & Kropf Mfg. Co., Chicago.

Union Truck to Build Plant—The Union Motor Truck Co., Bay City, Mich., plans to increase its capital stock to $500,000 and build a new factory. The company was organized three years ago. It began experimental work, putting the first Union truck on the market a few months later. Manufacture on a small scale continued but because of the war the company found great difficulty in getting



MODEL OF NEW STUDEBAKER PLANTS FOR SOUTH BEND—This wooden model is built to scale and shows every building which will be erected. The group will occupy 61 acres. There will be from between 3,000,000 to 4,000,000 sq. ft. of active floor space and 12,000 employees. This is all in addition to the present Studebaker plants. These new plants will have a capacity when complete of 500 cars a day. In the foreground at the right is the power house which will have a capacity of 8000 hp. The machine shop, half of which already has been erected, will be 475 by 1125 ft. This is the building with the sawtooth roof. Next to it is the four-story building which will contain the administrative office of the production department and also will be used for sub-assemblies. Beyond this, beginning with the building farthest away, is the foundry, the press steel stamping plant, forge shop, two-thirds of which is now erected, enameling plant, heat treating and carbonizing plant, closed body plant and final assembly. The building to the extreme end is the car storage and shipping department.

material. This difficulty has been removed and during the last few months the company has received more orders for trucks than it can turn out with its present facilities.

Hanson & Tyler Adds Branch—The Hanson & Tyler Auto Co., with headquarters at Webster City, Iowa, and branches in Sioux City, Omaha, Sioux Falls, S. D., and Fort Dodge, will open a branch house in Des Moines, Iowa. Fay Thompson of Webster City will be the manager of the Des Moines branch.

Boise Trade Forms Association—The Boise Automobile Trade Association has been formed to promote the motor industry and interests in Idaho and eastern Oregon, and "to extend the motor car into new and useful fields of service." One object will be to obtain legislation favorable to owners and dealers.

Drefs Opens Office in Detroit—A. G. Drefs, just out of Government service, has opened offices in Detroit, under the name of Drefs, Cunningham & Drefs. The company will render consulting service to automotive industries on problems of organization, production, distribution, finances, accounting and general taxes.

Marlin-Rockwell Back to New Haven—The Motor Radiator Division, formerly the Mayo Radiator Division, the Marlin-Rockwell Corp., which was located temporarily in New York because of war work, has moved back to the plant at New Haven, Conn. During the war this division manufactured airplane radiators for the Government.

Concern for Radiator Fan Manufacture—The Service Products Corp. has been organized at Indianapolis, Ind., with a capital of $50,000 and will make radiator fans for cars, trucks and tractors. The officers are: President, Harry J. Enders; secretary and treasurer, R. B. Parrott, and chief engineer, R. C. Root. Annular bearing fans will be featured.

To Make Bull Dog Piston Ring—The Steel Spring Piston Ring Co. has been formed in New York by A. J. H. Kuhsiek, formerly factory superintendent of Edward V. Hartford, Inc., and A. Mayer, formerly production manager of the same concern. It will make the Bull Dog ring, a three-piece ring with several novel points.

Cole Plans Export Trade—The Cole Motor Car Co., Indianapolis, Ind., plans an extensive export trade campaign and to this end Pablo Homs, export manager, will leave early this month for an extended trip through the European countries. Shipments are leaving the Cole factory daily for foreign points, and it is estimated that between 10 and 20 per cent of the total production of the Cole factory will be assigned to purchasers of cars abroad in 1919.

To Distribute Liberty in Indiana—H. Nelson Dunbar, who has managed the Ford assembly plant in Pittsburgh, Pa., for the last five years, is now at the head of the H. N. Dunbar Motor Co. as president and general manager. The company has opened up for business and will distribute Liberty cars in Indiana. Several years ago Mr. Dunbar was identified with the Waverly electric company, but his experience in the motor car field dates back to 1901, when he began selling cars in Boston.

Copeman Laboratories Are Sold—The Copeman Laboratories, Inc., Flint, Mich., have been purchased by New York and Detroit banking interests. Lewis Searing, New York, formerly vice-president and general manager of the Denver Engineering Co., Denver, Col., has been elected president and general manager. L. G. Copeman, formerly president, has been elected to the board of directors and will continue with the company. Mr. Searing states that the new management intends to increase production at once to care for large contracts already received and also will concentrate its efforts toward standardizing the Copeman method as a means of motor car lubrication.

ANOTHER ATTRACTIVE GARAGE—This is the place of business of the Elmwood Garage, Oak Park, Ill. Although as it stands, this is an attractive building, the concern intends to remodel and have an even better

Pennsylvania Opens Branch Office—The Pennsylvania Rubber Co. has established a branch office at Jacksonville, Fla., where it will carry a complete stock. Capt. J. L. Branan, recently of the A. E. F., is in charge.

Willys Opens New York Office—Permanent offices of President John N. Willys of the Willys-Overland Co. have been opened in New York. Mr. Willys expects to remain in New York most of the time, directing the affairs of the Overland and allied companies.

Weller to Assist Burtsell—J. H. Weller, formerly assistant production manager of the Packard Motor Car Co., has just been appointed assistant to B. W. Burtsell, president of the Herschell-Spillman Motor Co., North Tonawanda, N. Y., and will be in charge of production.

Westerdale and Keller Distributers—H. E. Westerdale, sales manager of the Heath-Duplex department of McCord Mfg. Co., and Ward Keller, eastern sales manager, have resigned to form the Lexington-Ohio Co., Cleveland, Ohio. The new firm will handle the Lexington cars.

Antigo Tractor Completes Model—The Antigo Tractor Syndicate, Antigo, Wis., has completed its first demonstrating model. It is designed by D. S. Stewart, who assisted in the founding of the Topp-Stewart Tractor Co., from which he retired two and a half years ago. The tractor uses a 32-hp. Doman engine and Hayes axles.

Appleton Engine Will Expand—The Appleton Engine Works, Appleton, Wis., manufacturing gas and kerosene engines and making heavy machinery repairs, will build a one-story machine shop addition, 48 by 90 ft., to handle increasing business. The company is establishing a department to specialize in tractor service and repairs.

Lewis Devotes Time to Private Interests—Eugene W. Lewis, form vice-president of the Timkin-Detroit Axle Co., has returned to Detroit from Washington, where he was with the chief production branch of the general staff of the army. He will not return to active duty with the Timkin company but will devote his time to private interests.

Indiana Distributer for Diamond Grid—Andrew W. Hutchison, president of the Detroit Electric Sales Co. and secretary of the Indianapolis Automobile Trade Association, heads the Storage Battery Co., organized to handle Indiana distribution for the Philadelphia Diamond Grid storage battery. The company will establish service stations in thirty-six centrally located Indiana counties but will carry its main stock in Indianapolis. Duncan F. Holliday, recently with the Exide battery distributing agency, is the vice-president, and Ralph K. Smith, treasurer.

Yellowstone Trail Moves General Offices—The Yellowstone Trail Association, Inc., has moved its general offices from Aberdeen, S. D., to Minneapolis, Minn. H. O. Cooley is general manager and J. A. Hillestad, secretary.

Prescott Now with Remy—F. H. Prescott has been appointed designing engineer on motor and generator equipment for the Remy Electric Co. Before going into Government service as second lieutenant in the Engineering Reserve Corps, he was a designing engineer in the motor car equipment section of the Westinghouse Electric & Mfg. Co. for two years.

Guthrie Back to Old Job—Maj. James Guthrie has been released from the U. S. Army and has returned to Cleveland, Ohio. He has reopened his consulting engineering office, having put aside his practice to enter active service at the beginning of the war. Major Guthrie served a year in the Ordnance Department at Washington and eight months as engineering manager of the Michigan ordnance district.

Eagle Increases Capital Stock—The Eagle Mfg. Co., Appleton, Wis., has increased its capital stock from $200,000 to $500,000. Additions to the foundry and machine shops will be erected at once. New officers have been elected as the result of reorganization following purchase of a major interest by new stockholders. Frank Satterlich, president and founder, and Oscar Saiberlich retire.

Clemens Buys Pioneer Iowa Concern—The Clemens Auto Co., Overland distributer, Des Moines, Iowa, has bought the controlling interest in the Hanson-Overland Co. at Waterloo, one of the oldest motor car concerns in Iowa. The purchase also includes a half interest in the garage building which the Hanson-Overland Co. occupies. G. V. Orr, who has been sales manager for the Clemens Auto Co., will be manager of the Waterloo branch.

Contractor Will Make Truck Bodies—After twenty years as a prominent contracting builder, J. T. Shoemaker has entered the commercial truck body business and now heads the Diamond Body Co., Philadelphia, Pa. There is more than 62,000 sq. ft. of floor space in the shop and the machinery just installed cost $15,000. Mr. Shoemaker has engaged several truck bodymakers who have been with some of the large body manufacturing concerns in the country. The concern will make bodies from the smallest units to 7-tonners.

From the Four Winds

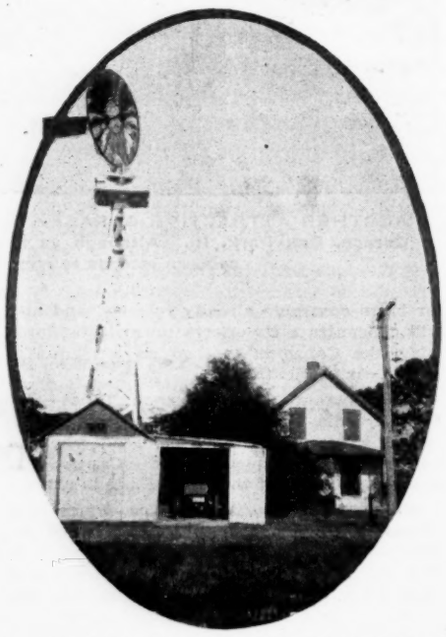
Glimpses at the World of Motordom

ALABAMA Motors Show Increase—Nine thousand more cars are in service in Alabama now than was the case at this time twelve months ago. The increase in commercial cars for this period is 1113; for private cars, 7902. There are 38,296 private cars in Alabama. In the three leading counties the number is as follows: Montgomery, 2081; Mobile, 2587; Jefferson, 7349. Commercial vehicles in the state total 7022.

Michigan Registrations Show Increase—The growth of the industry in Michigan is shown in statistics compiled by the secretary of state. In 1909 11,718 licenses were issued, while last year the total was 262,125, and estimates for this year indicate a registration of 310,000. During the first four months of the present year 63,108 licenses were issued in Wayne county, 10,607 in Kent, 6598 in Oakland, 6325 in Genesee and 5628 in Ingham.

New York to Prevent Glare—There will be strict enforcement of the no glare headlight law in New York state this year. State troopers have received orders to patrol the highways at night to enforce headlight laws, while in the cities police officers will attend to the enforcement. Lists containing the names of fifty-one lenses and devices, approved by the state bureau have been sent to police chiefs, justices of the peace and other officials in the state. These show just what lenses are legal and also give angles at which lights must be tilted when this is necessary.

Cleveland Club Adds Insurance—The Cleveland Automobile Club has gone into the insurance business. A department for handling the car insurance of its members has been put into operation and arrangements have been completed with a group of companies for the writing of fire and theft and collision insurance. The reason for the club's taking up insurance was the increasing demand on the club for adjustment of accident claims and traffic cases. Merely to offer legal advice and assistance was not going far enough and the club decided that the only way full assistance could be afforded members was to offer them straight-out insurance. No commission or compensation goes to the club, the entire saving in insurance premium going to the member.



BEEMAN RECHARGES ELECTRIC WITH WINDMILL—This windmill charges the batteries for a rebuilt Rauch & Lang electric and is giving excellent results, its owner, A. I. Root, writes from his Florida home. The windmill charges the batteries at the rate of 62 miles a charge. The outfit cost $700

Idaho to Complete Highway Links—Plans for the completion of the worst link in the North and South highway, which will form communications between sections of Idaho heretofore cut off from each other, have been approved. The link is between Grangeville and Whitebird and comprises about 37 miles. Under a 2-mill tax levy the state will raise $1,850,000 for highway purposes during the biennium, to which will be added appropriations of approximately $3,000,000 by the government.

Conrad Heads Ashtabula Club—Richard Conrad has been elected president of the Ashtabula Automobile Club, Ashtabula, Ohio. He served two terms as vice-president of the organization. C. V. Case has been elected vice-president, and P. F. Knowlton, secretary-treasurer.

Springfield to Have Touring Bureau—The Springfield Automobile Club, Springfield, Ohio, which was organized in 1905, is arranging to open new headquarters in the Shawnee Hotel, where a touring bureau will be maintained. A membership campaign has been started and many new names have been added to the rolls.

Highway to Be Worked with Tractors—The highway commissioners of Downs township, McLean county, Illinois, have purchased an Avery tractor, the 25-50 model, for dragging and grading the roads. In one day the machine covered 19 miles with a jumbo leveller, more than could have been handled by two teams of horses in a fortnight.

Pennsylvania to Buy Toll Roads—The state highway department is planning for the removal of all tollgates in Pennsylvania during the next two years. In the two-year period from June 1 there will be available from the state funds $500,000 for the purchase of toll roads on the state highway system. There remain 178 miles of such roads, chiefly in the southeastern section.

Trucks for Passengers and Freight—The Staunton-Livingston Motor Transportation Co., with headquarters at Staunton, Ill., has been organized and will operate a line of trucks for passenger and freight business between Staunton in Macoupin county, Livingston, in Madison county, and other points 10 to 20 miles distant and which are not now connected by steam or electric lines. A certificate of convenience and necessity has been asked of the state board of public utilities, and an order will be placed for trucks as soon as permission is granted.

To Blaze Canadian Highways—In preparation for what is expected to be a record-breaking invasion of Canada by motorists from the United States this summer, the American Trail Blazing Association will mark all the principal roads between the leading cities of western Canada with distinguishing colors. A. L. Meigs, president of the association, during the convention of the Saskatchewan Motor League, had a conference with S. J. Latta, minister of highways, and president of the league, and obtained permission to paint the signs on the long-distance telephone poles. The work will begin at once. Saskatoon already has made an initial grant to the association and trails will be denoted in colors on the following plan: Black will mark the roads running from Prince Albert through Saskatoon to Regina by way of Strasbourg, Hanley and Davidson; and from Saskatoon to Moose Jaw. Blue will be the distinguishing mark between Winnipeg and Edmonton through Saskatoon by way of Wilkie. Green will be used on the trails from Saskatoon to Calgary by way of Rosetown; and yellow on the roads from Saskatoon to Edmonton.

Coming Motor Events

SHOWS

Brictol, Va		May 10-17

MEETINGS

Hot Springs, Va	Automotive Equipment Association	June 2-6
Ottawa Beach, Mich	Society of Automotive Engineers	June 23-27

TRACTOR DEMONSTRATIONS

Sacramento, Cal	Sectional Tractor Demonstrations	May 6-12
Denver, Col	Sectional Tractor Demonstrations	June 8-14
Wichita, Kan	Automotive Committee of National Implement Assn	July 14
Aberdeen, S. D	Sectional Tractor Demonstrations	August 18-22
Ottawa, Ont., Canada	Inter-Provincial Plowing Match and Tractor Demonstrations	October

RACES

Indianapolis, Ind	May 31
New Nork	June 14
Tacoma, Wash	July 4
Cincinnati, Ohio	July 5
Uniontown, Pa	July 19
New Nork	July 26
Elgin, Ill	Aug. 22-23
New Nork	Aug. 23
Uniontown, Pa	Sept. 1
New Nork	Sept. 20
Cincinnati, Ohio	Oct. 1